COMMUNICATIONS WORLD

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Nixdorf eyeing PABX market

NIXDORF network products marketing manager Ingolf Schartel with his company's ISDN switch at Telecom '87. Entry-level systems could bow here — as plain PABXs. ***Picture by Luis Huesch***

By Luis Huesch

PADERBORN, West Germany — West German computer vendor Nixdorf is eying the Australian PABX market on the orders of its chief executive Klaus Luft. Nixdorf management is deliberating whether to apply for authority to connect its 8818 ISDN box as a digital PABX now or wait for Telecom to firm up its ISDN approval procedures.

Telecom's ISDN conformance testing machinery is expected to be fully in place later this year, and the monopoly's regulatory treatment of the approval process appears to be wilting under the heavy cloud of the government's policy statement, due next month.

According to company sources, Luft made the "go Australia" decision late last year after a visit down under. But because Telecom has not yet defined all the necessary steps for ISDN switch approval, any official move by Nixdorf had been delayed.

Alternatively, Nixdorf could apply for normal PABX approval for the 8818 modular ISDN System, which the company positions as the "hub for all office communications". Nixdorf sources said the company was looking at what was described as five volumes of Telecom specifications, but had not yet made up its mind which way to go. However, ISDN approval was its main objective.

Nixdorf Australia merely said the subsidiary was still "evaluating the situation". The local offshoot is about to join Telecom's so-called

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IBM displays some more comms clout

IDG News Service

WASHINGTON — IBM last week introduced a series of hardware and software products designed to improve the performance, reliability and cost-effectiveness of information networks.

Among the offerings at the Communication Networks '88 conference here were the IBM 3745, a high-speed communications controller, IBM's latest ad-

(Continued page 3)

Wan from West wins US backing

By Luis Huesch

PERTH — Majority Telecom-owned communications company QPSX has won international endorsement for its multi-megabit/sec packet-switching technology — and with it the prospect of massive export revenues.

The company's dual-bus communications network (see diagram on page 3) has been chosen for develoment as an IEEE standard for metropolitan area networks (Mans). According to QPSX, it is the first time an Australian company had its technology selected for this purpose.

To be known as IEEE 802.6 Man, the QPSX (queued packet and synchronous switch) network concept was backed in the relevant committee of the US Institute of Electrical and Electronic Engineers by AT&T and the regional Bell operating companies.

This is not surprising, considering that the concept is geared to give PTTs a powerful weapon in the looming battle for control of the intelligent networks of the future. Use of existing transmission capability, software definability and the built-in facilities for volume-based tariffing must make QPSX-type developments very attractive to beleaguered PTTs worldwide.

The Perth company, in which Telecom has a 60 per cent shareholding, says it sent 12 major missions overseas last year to present its case for standardisation. QPSX hopes this will give it access to PTT and commercial markets worth thousands of millions of dollars.

In essence, the QPSX technol-

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BHP ponders net bid by 'outsider'

By Luis Huesch

MELBOURNE — Broken Hill Proprietary Ltd (BHP) is poised to decide which way to jump in setting up its nation-wide backbone data network, the second stage in the company's complete network revamp which begun three years ago.

A company spokesman denied claims that the Big Australian had opted for a solution by US networks specialist Bolt Beranek Newman (BBN), rejecting local alternatives. The deal, worth "several million dollars", involves mainly multiplexing and packet-switching equipment.

The spokesman said BBN was "high on the list" of options being prepared for management. Four solutions were on the shortlist following BHP's call for expressions of interest. While they were on the whole similar, the company would have to concentrate on "economic justification", the spokesman said.

Influence

Asked if any of the bidders for the data network order had tried to influence the decision-making process, the spokesman said there had been "input by a couple of people", adding "but we're used to that".

The final decision on the successful bidder will be made sometime this month, the spokesman said.

The new data network will build on BHP's Megalink-based voice network, whose last Neax 2400 node was cut over in Brisbane in December. Remaking the voice

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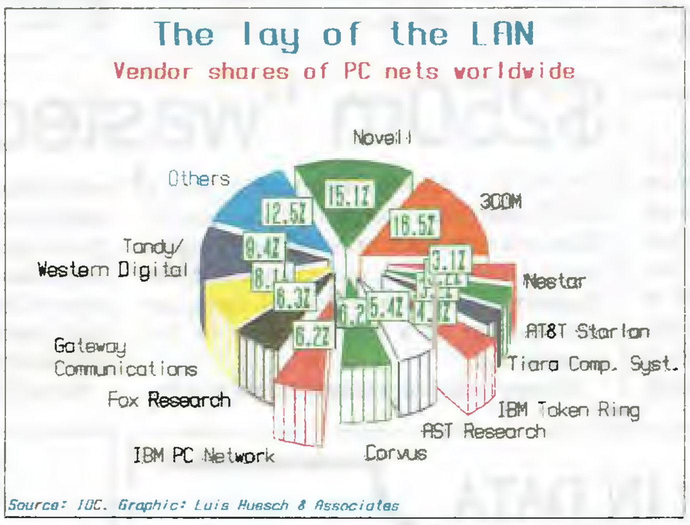

Source: IDC. Graphic: Luis Huesch & Associates

TOKEN RING, the dark horse of local-area networking, is tipped to hold sway over nearly half of the PC Lan market by 1990, according to Yankee Group forecasts, which see Ethernet reduce to a pitiful 10.3 per cent of that market by then. Even in the departmental connectivity environment, where DEC's darling is seeing its 60-plus per cent share of 1986 eroded to around 43 per cent this year, token ring is coming on strongly: installations have doubled in the past two years and are tipped to double again in 1988, giving the IBM product almost a third of that market this year. The diagram shows worldwide PC Lan installations by vendor in 1987. For more on Lans please see our Core Report starting on page 17.

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EXTRA! 2 sets of tables on Lans & Muxes

Nixdorf eyes our market

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ISDN Implementers' Forum, a group of some 30-40 PABX and communications vendors which holds regular meetings to thrash out problems arising from varying interpretations of Telecom's ISDN specifications. The meetings, held monthly last year alternating between Sydney and Melbourne, begin again this month but will be held only every second month.

A Telecom spokesman said the one-volume primary rate specification was in its final form now, with the basic rate specification expected to be finalised next month in a second volume. (Primary rate trials are now slated for next February.)

A specification on Telecom's proprietary T-Link tieline signalling is also still in draft form, according to the spokesman. This specification describes an in-band signalling protocol which lets ISDN PABXs from different vendors transparently support enhanced features on each other's switches that are not specified by the CCITT.

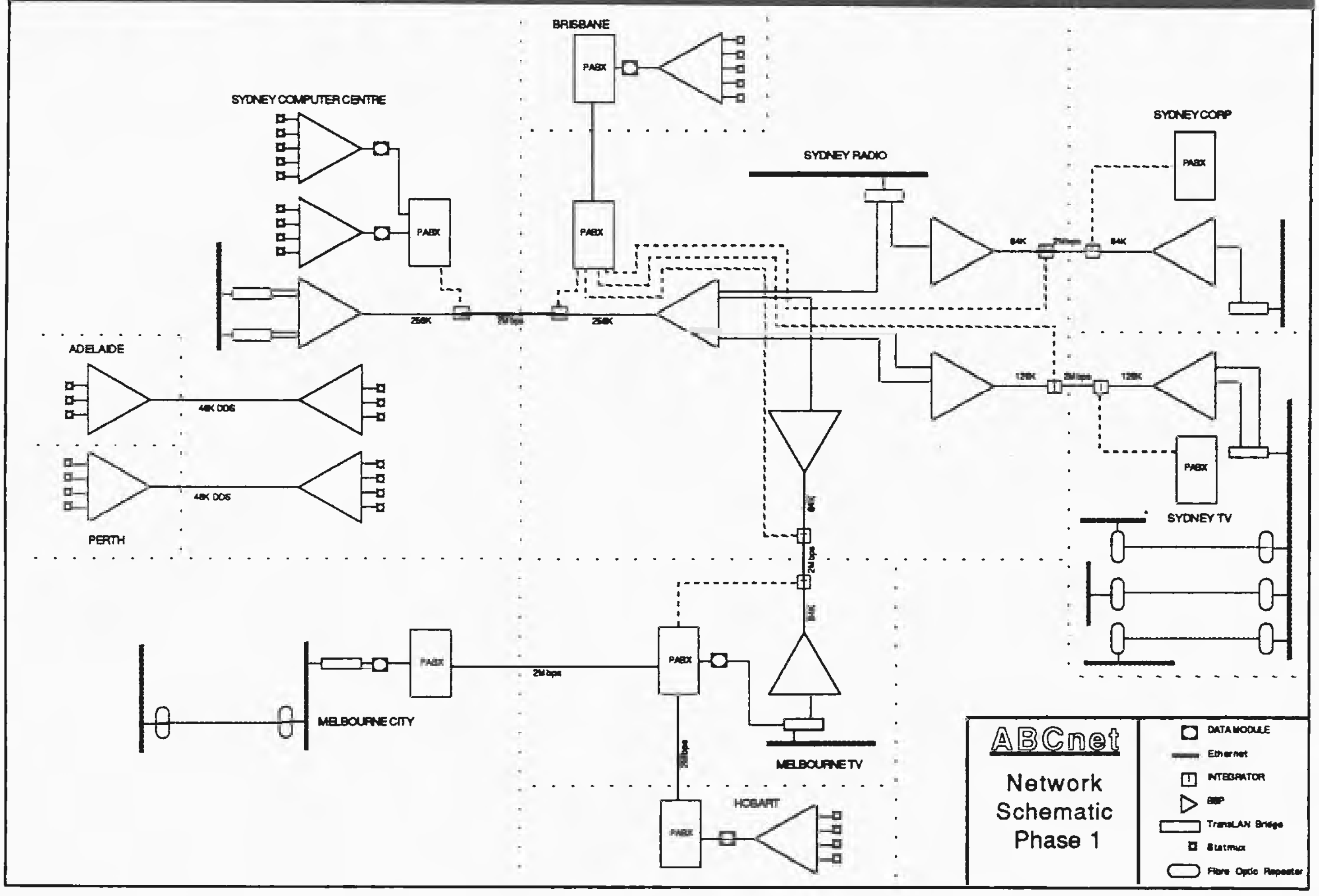
The spokesman said protocol test gear developed jointly with Siemens would allow any interested party to do development testing of its ISDN offerings. He said conformance testing to CCITT-consistent specifications was available. Telecom's ISDN implementation closely mirrored the CCITT recommendations and it had merely left out some undefined elements or national options adopted by European PTTs.

However, Telecom sources said that while the Siemens/Telecom automated protocol tester worked fine on layers one and two of the OSI protocol, "work still needs to be done" on layer three. It was expected to be fully operational later this year.

Nixdorf's 8818, described as "similar to Siemens' Hicom", was developed as early as 1983. It offers from 10 to 4000 lines, according to company officials, who said its strength lay in open interfaces for voice and data.

The vendor's Digifon was the first digital handset authorised for use on the West German network. It serves as a network terminating unit (NTU), being the final network node for digital transmission of voice, data, text and graphics. In addition to its ISDN NTU function, the Digifon is a feature phone in its own right, including such user functions as a 9000-name directory.

ABC net builds on switches



By Luis Huesch

SYDNEY — The Australian Broadcasting Commission has forged a costly centralised DEC-based data system and a Neax-based voice network into one flexible integrated wide-area network with lots of room for growth.

The network now caters for some 600 terminals and printers, but it is planned to provide Ethernet connectivity to the desks of a potential 3000 users. Remote Ethernets are linked to the ABC's main computer centre with its twin Vax clusters by Vitalink Translan 2 and Translan 3 bridges in Sydney and Melbourne. Micom statistical multiplexers are deployed in a "holding action", providing extra port capacity in Adelaide, Brisbane, Canberra, Hobart and Perth until Ethernets are installed in those sites.

A bevy of Neax 2400 switches — three in Sydney alone, with a fourth going in, plus two in Melbourne and two more in Hobart, and one each in the other capitals except Perth, yet tied together in a private network that now does double duty for data.

Economy and flexibility were the key considerations when the ABC's MIS networking group, headed by Gary Dowling, planned a new communications strategy for the nationwide ABCnet. To achieve these objectives, Dowling used innovative approaches such as "nailed up"* 48K-bit/sec circuits on Megalinks, and Scitec's Integrator 2000 data/voice integrators together with Scitec BSPT1 time division multiplexers (TDMs).

This made for configuration flexibility as

(Continued page 4)

$250m "wasted on installations"

SYDNEY — Consumers have to foot a $A250 million extra bill each year because of Telecom's monopoly on telephone installation and maintenance, according to what the Opposition leader, John Howard, claims are the findings of a secret report to the government.

Howard said in a press statement that this key finding was contained in a set of recommendations handed to the Minister for Communications, Senator Evans, before Christmas. Senator Evans reportedly will present the recommendations for a major restructuring of telecommunications policy next month.

According to Howard, the secret report found that the massive additional cost to the consumer is a direct result of alleged internal inefficiencies and overmanning within Telecom. He said the finding backed the Opposition's demand not to give "a blank cheque on pricing to a monopoly".

■ **Telecom 'not competitive' — page 5**

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Name change reflects growth

THE company which publishes this newspaper — Computerworld Pty Ltd — has changed name to IDG Communications Pty Ltd.

Managing director Alan Power said he decided to change the name not only because it directly aligned with the parent corporation IDG Communications Inc and its worldwide identity, but because Computerworld Pty Ltd was no longer appropriate to the spread of its publishing activities.

"Ten years ago, the company published one weekly newspaper, "Computerworld", Power said. "The company however now publishes six publications — *Computerworld, Australian PC World, Communications World, Australian Macworld, Digital World* and *Government computer news.* And there are more to come.

"IDG Communications provides a broader company image to reflect the broad range of information and computer professionals about information technology," Power added. "IDG is derived from the holding company International Data Group, which included the world's leading computer research company International Data Corporation (IDC)."

***Communications World*, which was published as a bi-monthly tabloid newspaper in 1986 and then as a monthly in 1987, has quickly developed a highly qualified readership. The publication team has been strengthened under Publisher and Editor Luis Huesch to be able to widen the paper's editorial scope.**

The name of the New Zealand company had also been changed to IDG Communications.

As well as a name change in 1988, special emphasis will be placed on the company's tenth year of service to the computer community. "I am proud of the contribution we have made to enhancing the knowledge and information skills of this community through our unparalleled information services," Power said. "The second decade will be even more challenging."

Standards bid boosts Wan from the West

(Continued from page 1)

In essence, the QPSX technology lets communications users build secure, economical, high-speed networks using the PTTs' and other carriers' networks, from PSTN via DDS to X.25 and ISDN, including future offerings such as broadband ISDN.

The standardisation process must continue through the US American National Institute of Standards before it can flow on to the International Standards Institute (ISO), the ultimate arbiter for computer and communications standards. But IEEE endorsement alone is a powerful persuader in any marketing effort in North America.

QPSX says negotiations for field trials of the multi-mode Man in the US are "close to completion". These would begin in March next year. In Australia, Telecom is installing a $A5 million pilot QPSX network for fast packet-switching and dedicated synchronous links of up to 140M-bit/sec.

The QPSX technology is claimed to allow high-speed digital traffic to be carried reliably, securely and economically over public networks for applications such as:

- Mainframe-to-mainframe links;
- Local-area network interconnection;
- Voce/data integration;
- High-speed image transfer; and
- Networking of scanning and Cad/Cam equipment.

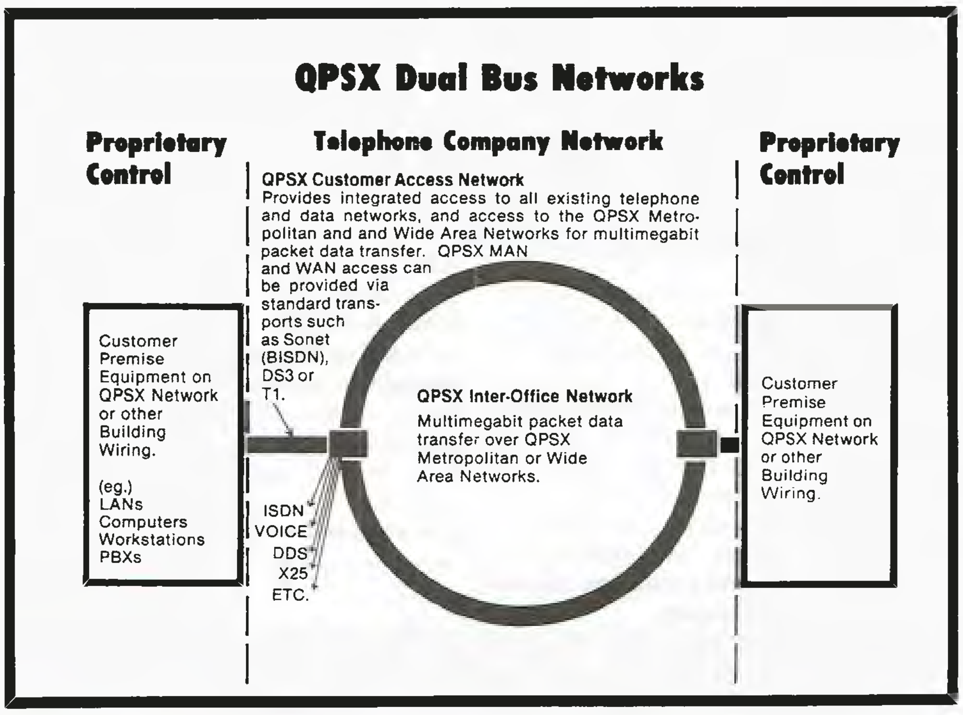
CCITT-conforming 140M-bit/sec systems can be used for high-speed wide-area backbone networks, while Megalink (2M-bit/sec) or T1 (1.548M-bit/sec) may be appropriate for building backbones and Lans including those with Man/Wan access.

Gateways are being developed for token ring (802.5), CSMA/CD (802.3) and fibre-distributed data interface (FDDI) networks, according to the company, which predicts volume availability of its product next year.

At the heart of the speed-independent QPSX system developed by engineers from Telecom and scientists from the University of Western Australia (who have a 20 per cent share in QPSX Pty Ltd) is the concept of "distributed queuing" of packets.

The QPSX protocol involves sending multiple packets in order rather than intermixed, and doing away with the usual request for authorisation to send a packet. This pares transmissions to the bone of address and data packets, boosting network throughput.

Software-defined network control can be exercised by the user, his or her PTT consenting, with multi-level priorities.


QPSX Dual Bus Networks

QPSX Customer Access Network
Provides integrated access to all existing telephone and data networks, and access to the QPSX Metropolitan and and Wide Area Networks for multimegabit packet data transfer. QPSX MAN and WAN access can be provided via standard transports such as Sonet (BISDN), DS3 or T1.

QPSX Inter-Office Network
Multimegabit packet data transfer over QPSX Metropolitan or Wide Area Networks.

Customer Premise Equipment on QPSX Network or other Building Wiring. (eg.) LANs Computers Workstations PBXs

Customer Premise Equipment on QPSX Network or other Building Wiring.

IBM controller

(Continued from page 1)

vanced logic circuitry as well as software enhancements.

The 3745, which uses three new high-density Application Specific Circuit (Asic) chips, can channel-attach up to 16 System 370 computers, allowing customers to construct distributed networks with high-speed data transfers, that reportedly will send twice the information for less money.

IBM also enhanced its family of software products for communication controllers, the Advanced Communication Function/Network Control Program (ACF/NCP) to support the 3745 controller and to allow users to communicate faster between mid-range and large computer systems. The 3745's support of up to eight Token Ring Networks, combined with the enhanced software, is claimed to improve communications between groups of endusers.

BHP network

(Continued from page 1)

network by tying together some 60 switches via Neax nodes, 2M-bit/sec pipes and tie-lines to analogue PABXs was the first phase in BHP's company communications plan devised in 1984.

Phase three — its start is still undecided — will see the Big Australian branch out into the world of value-added networks.

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ABC network runs on M2 innovations

(Continued from page 2)

bandwidth can be adjusted when the network grows — low speed circuits for stat muxes can be provided off the Megalinks as easily as 64K-bit/sec, or higher for Ethernets — and extra channels added easily and quickly. Additional benefits are reduced device connect costs, substantially lower data transmission costs as well as "vastly improved network performance", according to Dowling. The previous network was built around centralised servers with statistical multiplexers.

Under the new setup, the Integrator/TDM combinations derive most of the wide-band circuits required from Megalink circuits, but Telecom Digital Data Service (DDS) 48K-bit/sec circuits have been used where Megalinks are not yet available.

Ethernet runs on coax (2km of it at three Sydney and two Melbourne radio, TV and administrative sites, together with 1km of optical fibre cable) at its normal 10M-bit/sec rate, but is interfaced to the 2M-bit/sec links on the bridges. To avoid bottlenecks in highly interactive applications, parallel links have been set up for file transfers on 48K-bit/sec routes.

What about the future? The statistical multiplexers are being phased out, and the bridges are expected to have a service life of 5-10 years. At $A55,000 a kilometre per year, Telecom's optical fibre offerings are a bit too pricey right now for all but a well-heeled bank or two. Austpac is not much of a help either when the annual bill for a couple of dozen stations runs to some $A60,000. I guess we are all waiting for a bit of competition in the transmission department, Gary . . .

* Note: "Nailed up" circuits refer to data interfaces in PABX being programmed to hold open a connection to say one of 30 Megalink channels at either end of the link. The idea is new, at least to Telecom, but creative techies have used it before to obtain a quick-and-dirty local data line on the PSTN when the monopoly carrier could not get its act together in time.

Gary Dowling (right) with (left-to-right) network manager Steve Plummer and team mates David Shread and Guy Griffin line up against the backdrop of a live test of the new network equipment. Stacked in four racks, complete with analysers and PERT charts mapping progress, all gear was tested and shaken down for four weeks in what Dowling calls his "staging" phase. Debugging new equipment is easier this way . . .

OS/2 'misses card modems'

IDG News Service

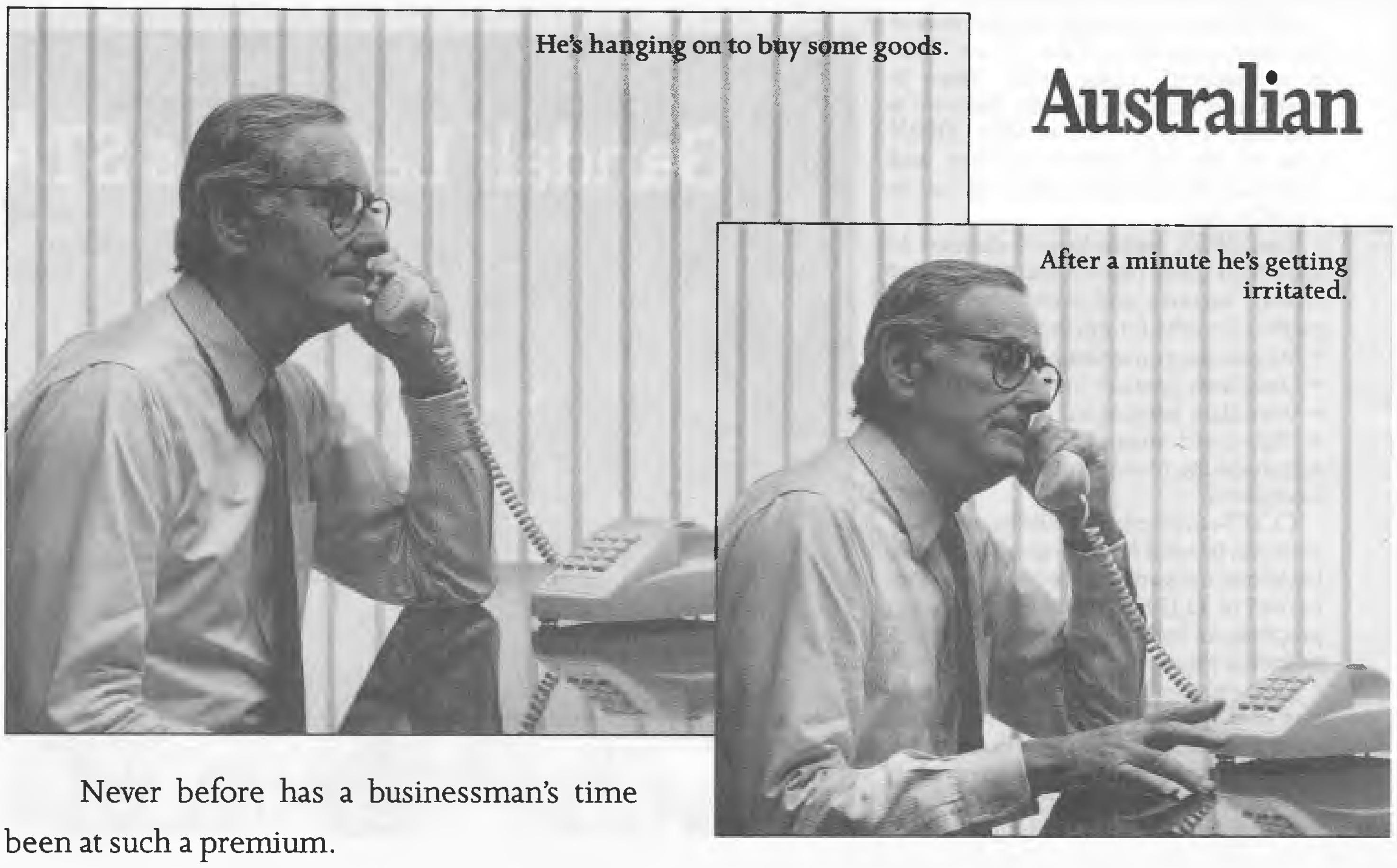
MENLO PARK, California — Because IBM's implementation of OS/2 lacks drivers for the 8250 chip, internal modems or PCs using that chip set as part of their serial communications parts will not work with protected-mode communication programs.

"The Microsoft COMM: device driver contains support for 8250-based asynchronous communications adapters. The IBM product doesn't have this support — IBM doesn't have any 8250-based asynchronous adapter products," the two companies said in a joint statement recently. In the US, most Hayes internal modems and several modem cards by other vendors are affected. In Australia the chip was used in Netcomm's shortcard PC Inmodems until the middle of last year.

This is the second communications-related problem associated with IBM's OS/2. Earlier last month, modem makers reported data losses at speeds of 9600bit/sec.

The problem occurs because the IBM driver is written for the 8250A interface chip set, according to Hayes.

C&C Computers and Communications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After a minute he's getting irritated.

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A more efficient business.

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Big or small, it will speed up the flow of information to managers and staff and control communication costs.

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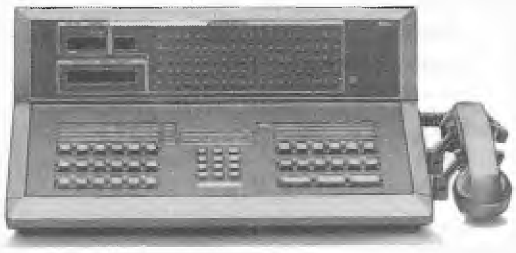

PABX Console

LINTAS NCX 2003

A blow against piracy

SYDNEY — Facsimile board distributor Systems Solutions has won a Federal court order against two Melbourne businesses which tried to sell cloned Gammafax cards complete with original Gammalink software.

Telecom, the Overseas Telecommunications Commission and the Bureau of Meteorology had reportedly received samples of the product, said to have been reverse-engineered in Taiwan and sold through a Hong Kong company.

The order was awarded, with costs, against Sotec and its principal Philip Lui, together with Box Hill Computer Centre and George Hanzalek. They were ordered to hand over any stocks of the software in question, and to stop selling the copied cards, made by Superwave Electronics Ltd of Taiwan.

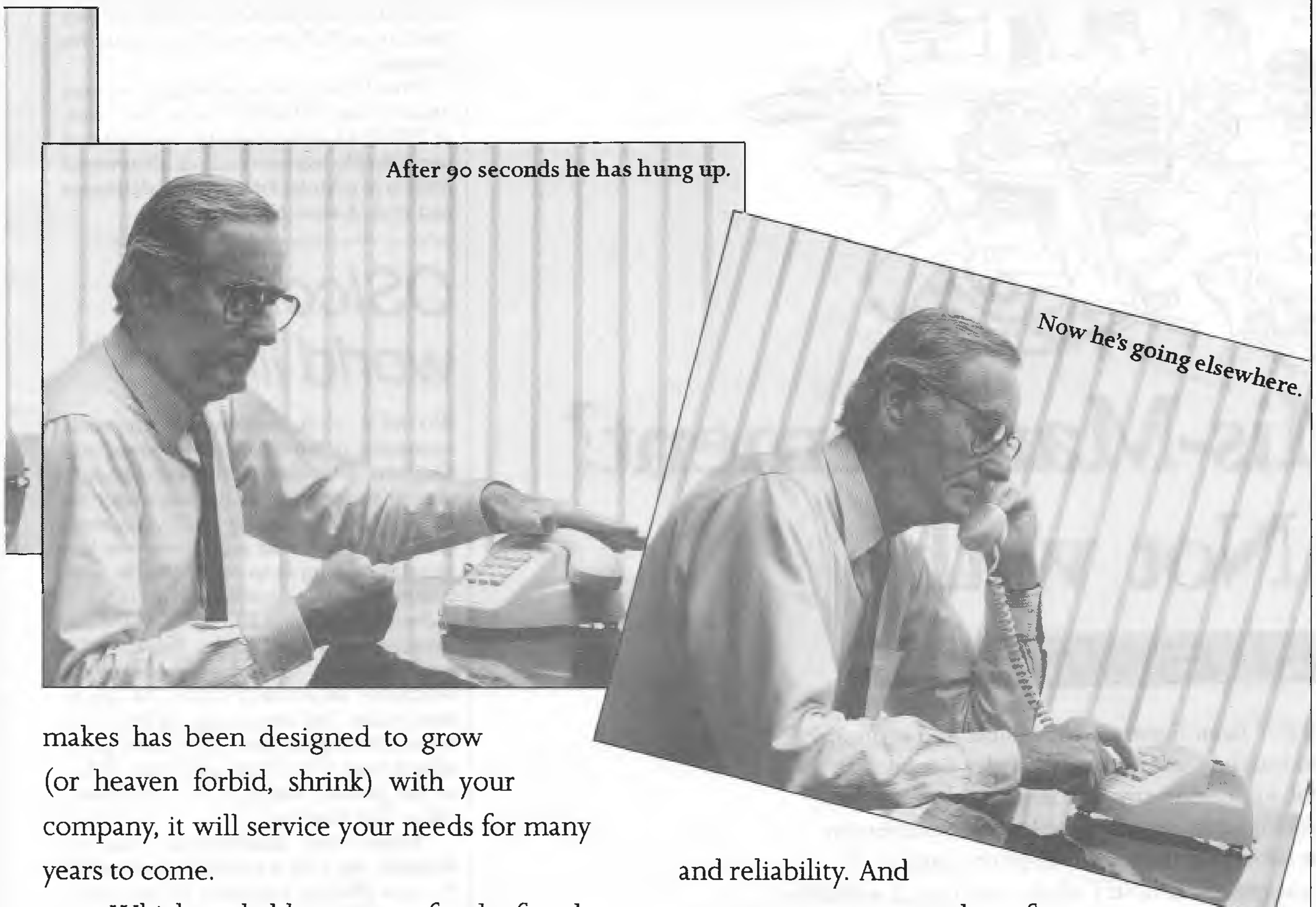
The court was satisfied that software found during a raids on both companies' premises late last year was identical to an early version of the facsimile communications program distributed by US vendor Gammalink with its Gammafax addon boards, except that in all but one instance the name Homsa had been substituted for the word Gamma.

No damages were awarded because no actual sales had been made.

A Systems Solutions director, Ivor Livingston, said Sotec had initially filed a cross-claim for unspecified damages for some 30 "lost sales" but had dropped the claim when it had learned the extent of evidence gathered by his representatives.

Livingston estimated his costs at $10,000.

business can't afford to hang on any longer.


After 90 seconds he has hung up.
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NEC

Telecom's pricing questioned

By David Beynon

SYDNEY — Telecom's new system of "Fee for Service" charging has slashed installation costs by up to 30 per cent for as many as 90 per cent of its commercial customers, according to the commission.

But the claim does not go undisputed: at least one consultancy denies that Telecom is cost-competitive with private installers.

The charging system, which has been phased in over the past six months in all Australian capitals, applies to the installation of small business systems (SBS) such as Telecom's Commander range, as well as extension points wiring and alterations, Telecom will continue to charge at the fixed "telephone standard price list" rate of $170 for the first telephone on new wiring.

According to Telecom, installation charges are now calculated as follows:

- $38 for the initial call to give the customer an estimate;
- $20 visit fee for each additional installation technician required.
- $12 for each person per quarter hour.

Telecom Sales will usually quote a maximum installation charge, allowing the installation crew to "work up to that price". The actual labor cost is left to discretion of the technical officer in charge of the job.

A spokesman for Telecom's Commercial Services Department, David Wills, said the new policy had resulted in "fewer rejections" of Telecom installation quotes. "There has been no adverse comment," he said. Asked whether Telecom was planning on altering the installation pricing structure once facilities wiring was thrown open to competition, Wills said the commission would be "fairly competitive". Only small-time installers might occasionally undercut Telecom's quotes, he said.

But Allan Harrison, managing director of the Sydney-based PABX Advisory Services. rejected any suggestion that Telecom had achieved cost competitiveness.

Harrison claimed his consultancy could arrange installation of "superior" mini PABXs, such as the Philips SBX or the Tadiran Emerald range at a cost which "would beat a Telecom Commander installation every time". As a "rough guide", Harrison quoted about $A3500 for the Philips SBX 6 installed with five exchange lines and six extensions. If a company was slightly larger and needed a 30-extension service, it could be in the market for a Tadiran Emerald at $A17000 installed, he said.

A Telecom spokesman was unable to provide even an approximate figure for installation cost of comparable Commander systems.

"It would not be fair to your readers as installation costs will vary according to wiring and conduit requirements," he said.

Harrison's criticism of Telecom's "Fee for Service" pricing hinges on the purportedly lower productivity within the Telecom ranks. It is alleged that the private contractors will instal two or three times more extension points per worker per day — obviously a crucial consideration when the Telecom meter is ticking over at $12 each 15 minutes per installer involved.

The privateers working to a fixed installation price, purportedly average $A75 per point, while Telecom's steep $48 per hour tech basis allegedly amounts to $A100 to $A120 for each point in the equivalent facility.

A call from the bridge

By Jim Brown

CARROLLTON, Texas — A teleconferencing bridge that enables up to 15 people to call a central telephone number and join a teleconference call has been developed by DSP Technology Corp. Confer-M is a customer premises device that can be used standalone or in conjunction with an analogue private branch exchange or an analogue port on a digital PABX.

Used standalone, it supports a group of five central office trunks sharing the same telephone number. Used with a PABX, the unit links to a line card capable of supporting five incoming lines.

As many as three teleconferencing bridges can be linked using a cable, dubbed a Confer Coupler, and the control or monitor port of each bridge. No additional trunks or line cards are needed. That port determines the number of additional parties that can be added to a teleconference.

When linked, the three bridges will enable 15 parties to join a single teleconference call or support three separate teleconferences of five people each.

With a standalone version of the product, users call a single telephone number to access the bridge. After answering a call, the bridge digitises incoming voice at 64K-bit/sec and sends a beep tone to inform parties already involved in the teleconference call that a new party has been connected.

When the bridge is used with a PABX, users can access it through direct inward-dial trunks or be transferred to the device by an operator. A user or operator can call individuals, either internal or external, and transfer those calls to the bridge.

Because the Confer-M supports an analogue interface, the digitised voice signal from a digital PABX must be converted to analogue. The signal must then be reconverted back to digital form by the teleconference bridge. A spokesman said the company has no immediate plans to introduce a version of the product that will accept digitised speech.

The product is compatible with NEC's Neax 2400 switch and Northern Telecom's SL-1 PABXs. Each Confer-M teleconference bridge costs $US2195. A Confer Coupler cable costs $US300.

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PMDT FLEX

Revamped Midas lacks the touch

SYDNEY — The Overseas Telecommunications Commission (OTC), hurting from inroads into its Data Access service by people using the faster, cheaper Austpac "door" to overseas databases, has revamped its offering to redress the balance.

As of February 7, the Data Access service (formerly known as Midas), offers 2400bit/sec dialup access as well as packet assembler/disassembler (Pad) transparency for binary file transfers.

Austpac users will bask in the knowledge that they have had 2400bit/sec dialup access since July last year, and that they can themselves configure the Pad to do what they like, and addition, it is transparent to the data stream.

(Yet they only pay $A10.80/hour connect time plus $A11/kilo-segment volume charge, compared to $A22/hour plus the $A11/kilo-segment fee on OTC's service.)

An OTC spokesman pointed out that Data Access was often better suited to the casual user as there was no signup fee ($A50 for asynchronous Austpac access) or standing charges ($A5 per network user identity or NUI per month per state for Austpac).

Other Data Access advantages cited were easier access (02-20991 for all data rates, or 20992 for transparent file transfer) and user-friendly features such as abbreviated dialling to popular international databases and end-of-session call statistics.

OSIcom in world linkup

SYDNEY — A multi-vendor electronic messaging demonstration in Sydney and Canberra later this month will highlight groundswell of international support for the CCITT X.400 message handling system (MHS) — and it may usuher in a new text services offering from the Overseas Telecommunications Commission (OTC).

Participants in the 12-member OSIcom demonstration booked for February 18 were reluctant to comment about the worldwide experiment before the actual launch date. But some intriguing bits of advance information came in a recent press release from OTC's Peter Lansdown, billed as the product manager for unidentified "New Text Services."

"Super-smart international directory facilities" are only a small but vital part of the new offering, according to Lansdown. He said OTC was still engaged in service negotiations after successful X.400 trials last year with European, US and Japanese partners.

It was hoped to announce public message handling service early this year.

Most likely in the short term is adoption of X.400 interworking with overseas systems on Keylink D (formerly OTC Minerva), the Dialcom-based half of the Keylink electronic mail service.

The OSIcom experiment, which follows an impressive X.400 demonstration by carriers and equipment vendors at Telecom '87 in Geneva and a similar EurOSInet demonstration during Compec '87 in London late last year, will be hosted by Communications Minister Gareth Evans at the Canberra end.

Taking part are Data General, Datacraft, DEC, Fujitsu, Hewlett-Packard, Honeywell Bull, IBM, ICL, Nixdorf, OTC, Unisys and Wang.

New netware shown at Macworld

By Graeme Philipson

SAN FRANCISCO — The giant Macworld Expo held in San Francisco on January 15-17 saw the release of a number of major new Macintosh networking products. They were some of over 100 new products or major upgrades released at the conference and exhibition, which turned into a showcase of the Apple Macintosh as a business machine.

40,000 people attended the Expo, packing the 360 stands on the floor of San Francisco's giant Moscone Center and being turned away from many of the more popular presentations. Many products took advantage of the color capabilities of the Macintosh II, and of Apple's new Hypercard applications development environment.

The major new networking product was a new release of Apple's Appleshare PC, which allows IBM PCs and PS/2s to access information on an Appleshare file server. (Appleshare is Apple's low speed, low-cost Lan). The new release allows the IBM PC to create files and directories on the file server, which appear as normal MS-Dos or OS/2 files and directories to the PC.

So what? The big difference in the new release is that these files and directories then appear as Macintosh file icons to any Macintosh computer attached to the same Appleshare network, and can be accessed by the Mac.

For example, a Macintosh can directly access files created under, say, Lotus 1-2-3 and read them directly into Microsoft Excel, and vice versa. It is seamless interfacing at its best.

Many independent vendors released Macintosh networking and communications products, including an improved version of Phonenet from Farallon. Phonenet allows Appletalk to run over much larger networks and different media and topologies than Apple intended — and Apple itself is Phonenet's largest site.

Many vendors, including AST and Tops, released other products that allow the Macintosh to read MS-Dos and OS/2 disks. There are now so many such products they are a commonplace. There were also 3270 cards for the Macintosh II, modems that can be accessed by all Macs on an Appletalk network, and a host of similar products.

But perhaps the most important news at the conference was the joint announcement by Apple's John Scully and DEC's Ken Olsen that the two companies would co-operate on future product development, and would base all their future networking products on OSI. No products were announced, but the action should start around August.

Olsen and Scully specifically said that their alliance was not aimed at IBM. But intentional or not, it is impossible to escape the threat this poses to the industry giant, and to all other vendors. Apple and DEC are two of the most innovative, dynamic and successful companies in the computer industry. This alliance could be the most important development of the 1980s for the computer and communications industries.

- *Graeme Philipson is editor of* Computerworld Australia.

Macs get gateway to SNA

CUPERTINO, California — Apple Computer has produced a gateway enabling Macintosh micros to access IBM Systems Network Architecture (SNA) environments using LU6.2 protocols.

MacAPPC is a hardware and software product that will enable Macintosh applications supporting IBM's Advanced Program-to-Program Communications (APPC) to access other APPC-compatible applications running on other processors attached to an SNA network via LU6.2 Site licences ($US2500) are expected to be available in the third quarter.

The two-piece MacAPPC supports a client/server architecture. APPCC applications running on Macintosh Plus, Macintosh SE and Macintosh II microcomputers are clients that link via an Appletalk network to a Macintosh II outfitted with a MacAPPC board.

That board, which runs SNA 6.2 Peer Communications Facility software licensed by Apple from Orion Network Systems acts as a server and supports LU6.2 protocols needed to link the Macintosh to the SNA network.

The client/server approach differs from the way IBM implements APPC on its micros, where each PC seeking access to host-based APPC applications is required to run a full implementation of LU6.2 software.

Conversely, the client/server architecture frees Macintoshes on Appletalk networks from having to support a full LU6.2 implementation because most of the LU6.2 communications code runs on the MacAPPC board.

Apple also readied software that links Appletalk networks to DEC Vax minicomputers running under VMS. Appletalk for VMS will enable Vax resources such as disk storage space and Vax applications built to work with Macintoshes to appear to a Macintosh as virtual Appletalk nodes.

Appletalk for VMS is being introduced two weeks after DEC and Apple announced they would jointly develop products to link Macintoshes and Appletalk networks to DEC Vaxes. Site licensing ($US5000) is expected to begin next month.

Apple executives at the same time backup up the company's commitment to MIS with guarantees to provide multivendor integration by supporting the major interoperability standards, including APPC, OSI, ISDN, X.25 and TCP/IP.

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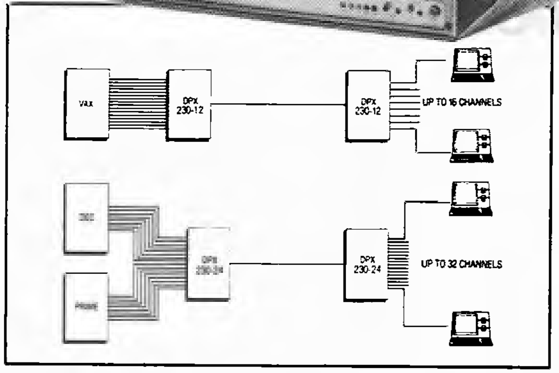

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U-Bass launches architecture

IDG News Service

NEW YORK — Ungermann-Bass has unveiled a system architecture claimed to enable disparate local-area networks (Lan), asynchronous and IBM 3270 terminals to share files and applications over an company-wide network.

Access/One provides a platform on which protocols, applications services and network management are run. The system is protocol-independent, supporting both Xerox Network Systems (XNS) and Transmission Control Protocol/Internet Protocol.

It also provides a migration path toward OSI, the company said. Network management and support for IBM's Netview are also provided.

The system uses an Ethernet backbone, transmitting data at 10M-bit/sec over shielded or unshielded twisted-pair wiring.

Company chief Ralph Ungermann said the system was aimed at ending the MIS manager's multivendor nightmare. Access/One's modular design enabled MIS managers to connect departments and buildings that have been wired together. The manager inserts a card corresponding to the particular communications environment into slots in the main unit, which is located in the wiring closet. This also makes moving equipment around the network easier.

Six cards — the network interface, supervisor, asynchronous interface, 3270 interface, Ethernet concentrator and token-ring concentrator modules — can be arranged in any fashion in 11 slots in the system's enclosure.

The network interface module connects to the system to the backbone. It is available in baseband, broadband or fibre-optic versions.

Token ring concentrator

The supervisor module manages all the network interfaces, the system's temperature, power supply and other modules, relaying information to a network management console.

Up to eight asynchronous and 3270 devices can be attached to each corresponding interface module. Up to ten 3270 or asynchronous modules can be fitted into the enclosure.

The Ethernet concentrator supports 12 Ethernet connections at distances of up to 100m. In all, 120 Ethernet devices can be supported.

The token-ring concentrator supports up to 20 workstations over twisted-pair wiring; with daisy-chaining, it supports up to 220 devices.

Access/One's network management capabilities enable the system to diagnose and remedy failures without operator intervention.

The main system's enclosure, which fits in a traditional telephone wiring closet, is priced separately, as is each module. An entry-level system costs $US10,000 and includes a power-supply enclosure, interface card and two or three communications modules.

Remote 9370s simulated on GE network

ROCKVILLE, Maryland — Responding to demands for distributed processing, GE Information Services recently began offering a remote computing service that simulates an IBM 9370 departmental computer. The Mark 9000 service, which is run on a GE IBM 3090 mainframe, offers software such as IBM's MVS/XA, DB2, DL/1, CICS and other large mainframe packages not currently offered by IBM on 9370s.

The Mark 9000 was created in answer to what industry observers see as a key use of the 9370: as a distributed processor that will be managed from a remote central site.

A typical monthly cost for the Mark 9000 service under a three-year contract is $US16,000, which is about 4 to 5 per cent less than owning a 9370, including software, support and personnel expenses. The service is already being used by several customers, including National Westminster Bank PLC in London.

A 9.6K-bit/sec leased line is offered as access standard, but the system can also operate at 56K-bit/sec.

Mux serves branch office

ALPHARETTA, Georgia — Digital communications Associates (DCA) last month introduced a smaller version of its System 9000 T1 (M2) multiplexer designed for use in corporate branch offices. The System 9000-S supports up to eight T1 trunks and is hardware- and software-compatible with DCA's larger System 9000 multiplexers.

The new mux uses the same line interface cards as the other System 9000 family members and can be located anywhere in a DCA network, according to the vendor. It is also possible to control and configure the device using DCA's Network Management System.

As with the company's larger multiplexers, the System 9000-S supports both pulse code modulation (PCM) and adaptive differential pulse code modulation (ADPCM). PCM supports 24 64K-bit/sec voice channels per T1 link, and ADPCM enables up to 44 channels to be squeezed into a 1.54M-bit/sec digital T1 pipe.

The multiplexer will be available in the US by the third quarter of 1988 priced between $US25,000 and $US40,000.

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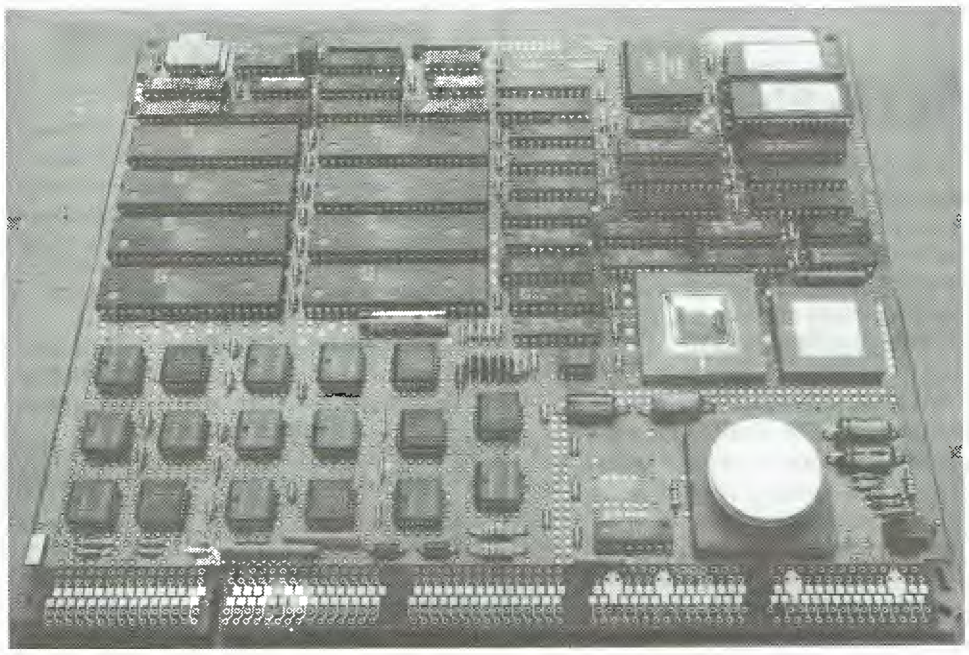

DEC's new Vaxbi controller . . . 'at the top end of technology'

SYDNEY — DEC Australia expects worldwide sales of several thousand units of its locally designed Vaxbi direct connect terminal interface, one of the first backplane interconnect bus (BI) products developed outside the US.

The new DHB32 communications controller was designed by DEC's Australian Computer Special Systems team. It is made in Augusta, Georgia, using a 10-layer circuit board, with application-specific circuit (Asic) chips from Digital's Reading, UK, facility. First shipments began in mid-December.

The controller lets a combination of 16 asynchronous modems, terminals and serial printers communicate concurrently and independently with a Vaxbi processor. It is targeted at users with existing wiring for a host-based systems, and those who opt for direct connection rather than a networked approach because of special security requirements.

DEC Australian managing director Frank Wroe, speaking at the release of the DHB32, said the local subsidiary aimed to become Digital's "hub for communications development". He also said DEC would provide more PC connectivity solutions, but would itself stay out of the PC market.

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SRA moves to marry voice, data

SYDNEY — The NSW State Rail Authority (SRA) is to replace its 15-year-old mainly crossbar switch-based voice network with a $A10.4 million voice-data net built on Ericsson MD110 PABXs.

The PABX system will become the backbone of the SRA's communications network, and will be one of the biggest private total networks in Australia. The installation is part of the authority's five-year communications strategy of upgrading to third-generation systems. The SRA cited the Ericsson switches' capability of being linked by microwave as well as optical fibre or telephone lines as a particularly attractive feature.

The contract covers a total of five MD110 switches.

The authority said the system on order allows full integration of the SRA's voice and data traffic and caters for all of its present needs while being capable of interfacing with other networks which conform to the SRA's strategy. Industry observers said this was a pointed reference to the current communications policy power-struggle in the State, which will have to wait until after the NSW elections before it is resolved with an overall network strategy a la Vistel.

Two of the MD110s are already on trial at the SRA's Homebush and Chullora sites in Sydney. When completed, the system will cover five Sydney metropolitan locations and 17 country areas.

DB engine welcomed

FRAMINGHAM, Mass — Users have welcomed the announcement of a potentially standard-setting database engine for local-area networks, SQL Server, developed by Sybase, enhanced by Ashton-Tate and licensed by Microsoft. It is due to be reach the market in the second half of this year.

SQL Server, which runs on 80286 and 80386-based micros, reportedly harnesses the power of the OS/2 operating system and a set of large system utilities to perform tasks that previously required minicomputer or mainframe computing power. Among other benefits, users will be able to simultaneously access the network server with multiple personal computer programs.

EDITORIAL

Ill-timed — and ill-reasoned

TELECOM'S push for timed local calls was ill-timed, to say the least: it promises to leave almost as much egg on the PM's face as he carried off in his ill-fated run with the Australia Card. But quite apart from the timing, the reasoning behind the proposal is patently suspect and full of holes. Telecom's Roger Banks jumped around some of them rather embarrassingly when he tried to explain the carrier's rationale on AM recently — it came off like the soundtrack to the fable of the Three Big Lies; "I am from the government, I am here to help you . . . " Fancy someone earnestly telling you that you have to be charged for something that was essentially free before so that you can now "control your spending". Repressing instant hilarity at the notion, let us look at some of the premises behind Telecom's argument taken up so assiduously by Bob Hawke and his single-minded fellow-travellers.

The PSTN was put in for voice calls — it is now being abused by businesses sending reams of facsimile messages. *Now all those businesspeople being targeted here as the bad boys will recall that one of the prime selling points of fax is that you can send messages in half a minute or less. Considering that it would be rare for a normal transmission to be more than eight pages, business users would not pay MORE for their alleged abuse but LESS, namely 16¢, for staying under the proposed four-minute limit. Sounds fair, doesn't it? Particularly coming from a "vendor" whose belated scheme of a dedicated facsimile network capsized at its launch last year . . .*

PC users tie up the voice network with calls to databases and get away with paying just the 20¢ local call fee. *In essence, this argument falls flat because most business users accessing databases will be using Austpac and OTC Data Access lines already, paying handsomely for the privilege rather than "exploiting" the private populace Telecom purports to protect . . . As for private bulletin boards: it has been argued convincingly that these usually non-profit messaging hubs fulfil the role played in national development by ham radio. Quite apart from this, most bulletin boards limit the duration of individual calls, generally to half an hour.*

We want to protect scarce network resources. *It appears there is a team of dismal science advocates at work in Telecom HQ, how else do you explain to the gaping crowd that you protect scarce resources such as AXE switches by putting in expensive differential charging machinery of hardware and software.*

The ATEA's Mike Musemeci has some definite ideas about just how much it all might cost. A small-ticket item such as software and a few IBM minis for charging local directory enquiries alone runs to $A11 million, if implementation sticks to budget . . .

We want to protect the needy, the handicapped, the disadvantaged — *this latter category no doubt including all those left hanging for half-hours on Telecom enquiry lines. A monumental task, and one that no service-oriented business would like to tackle unless forced by massive economcic reasons. Which brings us to the last argument, and the one that is, in the light of all the above, shaping up as the most specious of all:*

We don't want to make money out of all this — It's going to be "revenue-neutral". *Ah yeah . . . show me! As it looks now, Telecom is going to mint money from the new charges, even though much of it would flow back to a few selected comms vendors for supplying equipment, software — and, one suspects, consultants — to our disinterested monopoly.*

Perhaps we could have some alternative scenarios, such as competition down to the local loop — at least for those big bad business users?

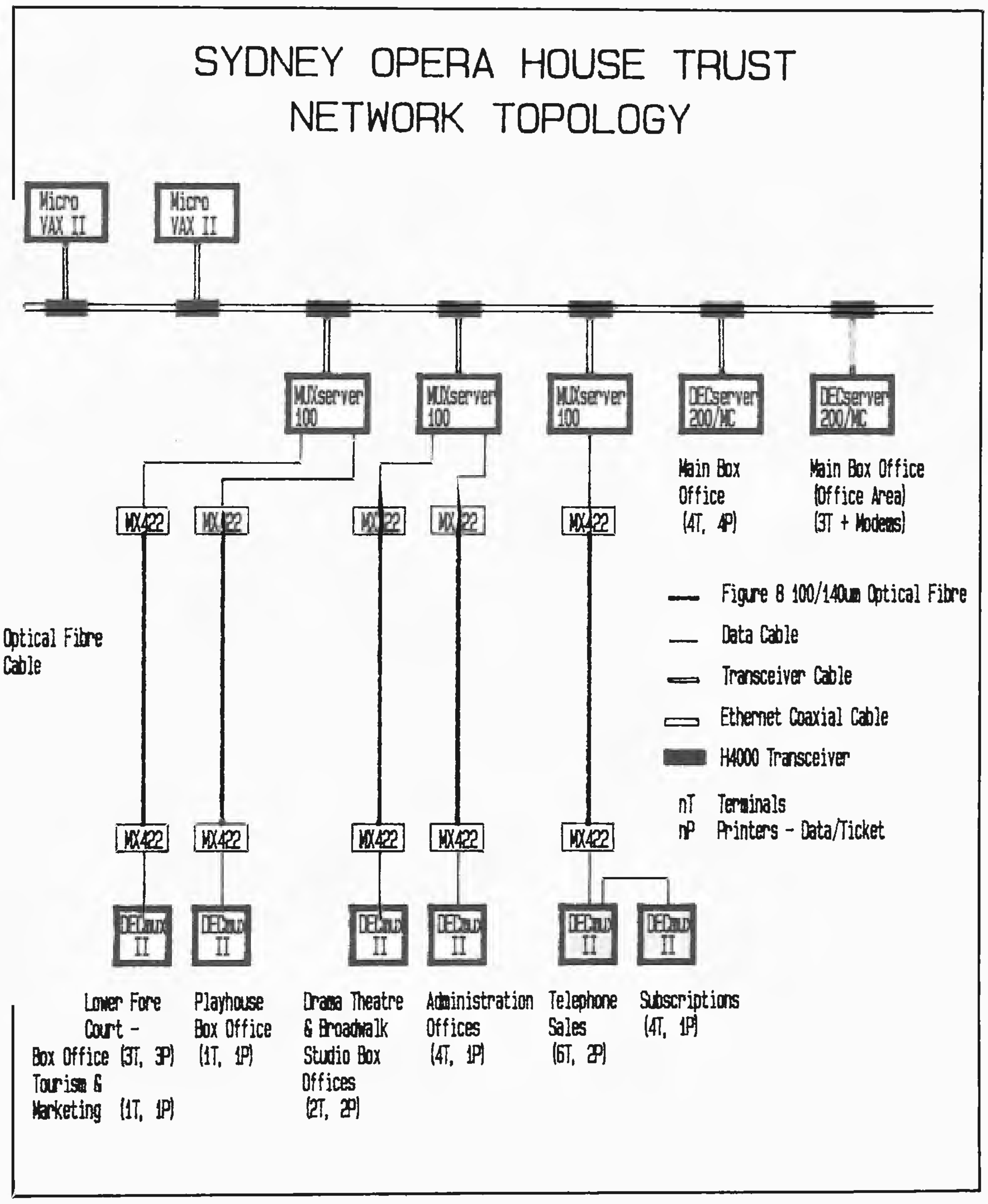
Luis Huesch

Sydney Opera House scores system

SYDNEY — The Sydney Opera House is ringing with success, having set up a "state-of-the-art" networked computerised ticketing system with $A500,000 worth of help from its friends at DEC Australia. The NSW government accompanies this to the tune of $A750,000 so patrons can now enjoy faster and more accurate bookings.

The network is based on two Micro Vax II hosts. A total of 21 terminals and 11 printers deployed in the Opera's secondary box offices and administration areas are connected to the network via six Decmux II statistical multiplexers and MX422 optical fibre modems.

Three Muxserver 100s with H4000 transceivers provide the connection to an Ethernet backbone. Seven terminals and four printers in the main box office are connected directly to the Ethernet via two Decserver 200/MCs.



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Associate Editor: David Beynon
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SYDNEY HEADQUARTERS:
IDG Communications Pty Ltd, 37-43 Alexander Street, Crows Nest, NSW 2065, Australia. Tel: (02) 439 5133. Tlx: COMWOR AA74752. Fax: (02) 439 5512.

MELBOURNE OFFICE:
IDG Communications Pty Limited, 74-76 Eastern Road, South Melbourne, Vic 3205. Tel: (03) 690 2933. Tlx: COMWOR AA33926. Fax: (03) 690 4362.

QUEENSLAND REPRESENTATIVE:
Jane Fewings, Media & Advertising Associates, 21 Kirkdale Rd, Chapel Hill, Qld 4069. Tel: (07) 378 4522. Fax: (07) 878 1071.

CANBERRA OFFICE:
IDG Communications Pty Limited, PO Box 21, Waramanga, ACT 2611. Tel: (062) 88 6982. Fax: (062) 889 821.

PERTH OFFICE:
IDG Communications Pty Limited, Suite 8, 272 Hay St, Subiaco, WA 6008. Tel: (09) 388 1828. Fax: (09) 382 3440.

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IDG COMMUNICATIONS

France launches ISDN

PARIS — France has launched the first commercial phase of what is to become a nationwide integrated services digital network (ISDN) by the end of the decade. With its so-called Renan project in St Brieux, Brittany, the government hopes to give French industry a major stake in a nascent worldwide market that is expected to blossom into a multibillion-dollar business by the early 1990s.

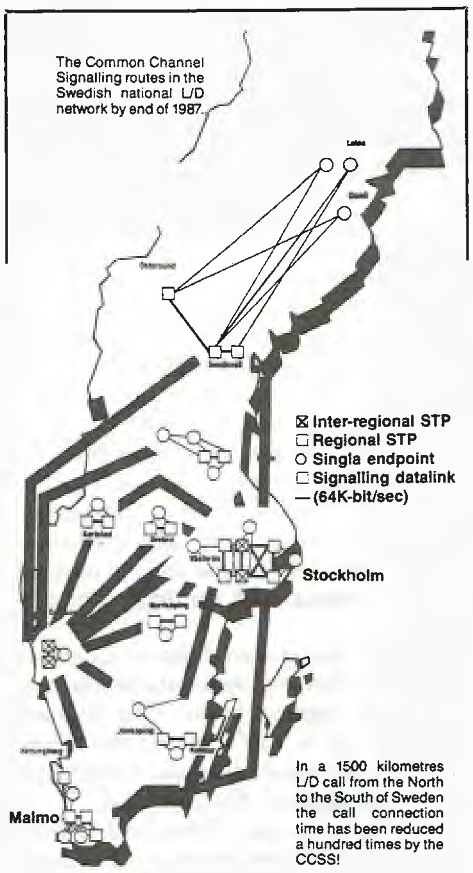
As telecommunications companies around the world begin to look to ISDN as their major potential revenue generator of the future, France looks well positioned to become the first country to offer a nationwide service. By September 1988, the network is to be extended to the Paris area and, during 1989, should expand to include the cities of Rennes, Lille, Lyon and Marseille. The first international connections are to be added in 1989. If all goes as planned, by 1990 all of France should be covered by the network.

Most of the newly-connected 300-odd early ISDN users plan to use Renan for intra-corporate communications (between a bank and its agencies, for example), but several are already looking at intercompany data- and image-exchange applications.

The 2B + D basic rate service costs a one-time connect fee of $A175 plus a $A78.50 monthly subscription. For complementary business services, subscribers must pay an additional $A10.85 per month. Traffic will be charged at rates of 48c per minute for distances up to 50km, 95c/min for 50 to 100km and $A1.63/min for distances greater than 100 km. Rates are tipped to decrease as the service is extended throughout the country.

A primary access service corresponding to the CCITT S2 interface, composed of 30 B channels at 64K-bit/sec and one D channel at 16K-bit/sec, is to be offered from 1989. Serving high-volume applications, it will enable the interconnection of big private branch exchanges and computers into intelligent networks. Subscriber connections will use ordinary, twisted-pair, copper wiring with a CCITT universal S plug. The French PTT also provides a small, T-interface digital network terminal.

The European Community (EC) believes ISDN will represent a $A57,000 million market in the 12 member nations by the end of the decade and a $A285,000 million world market in the next decade.


The Common Channel Signalling routes in the Swedish national L/D network by end of 1987.

In a 1500 kilometres L/D call from the North to the South of Sweden the call connection time has been reduced a hundred times by the CCSS!

Swedish digital network completed

STOCKHOLM — Sweden completed its all-digital trunk network on schedule late last year, spending $US1000 million a year in the past three years to be able to offer its customers switched 64K-bit/sec service anywhere in the country. Sweden's expected annual growth rate for data calls is 75 per cent a year during the next few years.

The digital network is based mainly on single-mode optical fibre cable and 84 AXE exchanges serving 1.75 million lines — almost one third of all subscriber lines. CCITT No 7 Common Channel Signalling is deployed on all AXEs, and call setup time for a 2000km north-south connection is a mere 0.2sec.

The Swedish PTT, Televerket, has carried out internal Integrated Services Digital Network (ISDN) trials since early 1985, will run inhouse field trials next year and operate commercial pilot services to customers in the country's three main cities from 1989 with both 2B + D and 30B + D offerings. It will initially use dedicated ISDN AXE exchanges in major cities and integrate ISDN functions into regular AXE exchanges from 1991, depending on customer demand.

Televerket is facing a rapid process of deregulation and increased competition, including for international traffic. It has therefore begun a large-scale expansion program of long-distance and international links and plans to offer an increasing range of services, including virtual private networks. From 1992, when Televerket expects to introduce 2M-bit/sec on the digital network, switched video-conferencing on PSTN lines could be offered. It expects to upgrade its fibre-optic backbone network to 2.4G-bit/sec around 1990 if demand for capacity continues at present rates.

Meanwhile Televerket has recently adopted the unusual strategy of retaining electro-mechanical exchange switches — including motor-driven 500-switch units installed in the 1930s — into the next century, running them in parallel with AXE switches.

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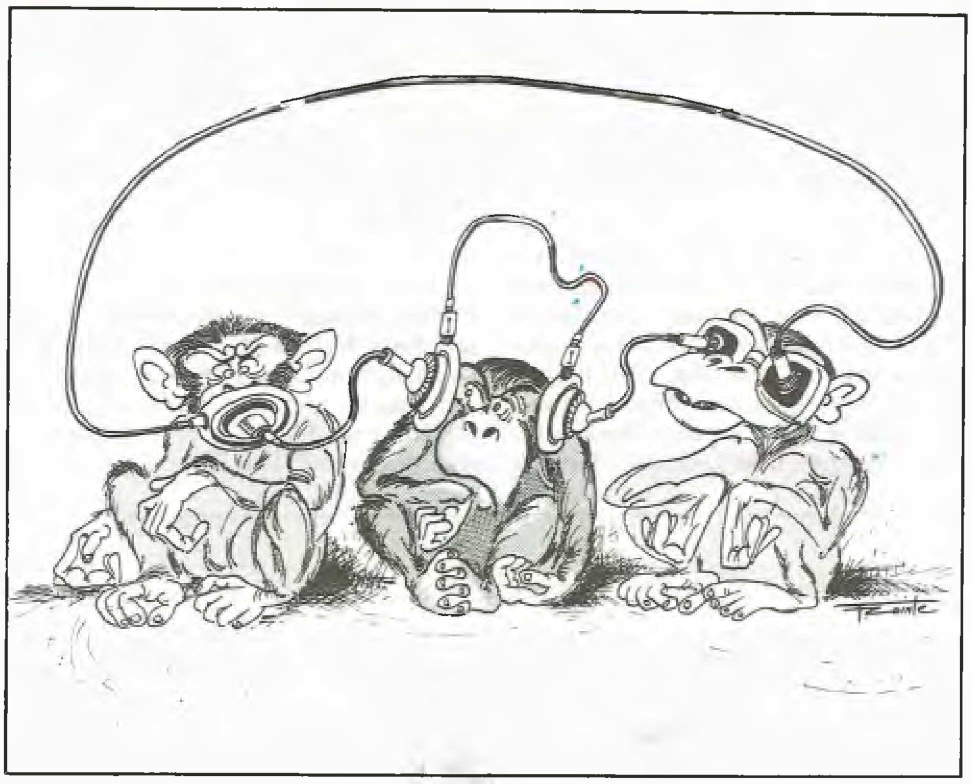
In a buyer's market, vendors push price, performance

Comms processors smarten up

By John Hunter



USERS are finding that it is a buyer's market for communications processors, just as it is for most data communications products. Competition is intense, and markets are not expanding rapidly. According to International Data Corp, the communications processor market will grow at an annual rate of only 10 per cent through to 1990.

Vendors, therefore, will have to pitch price, performance, service and special capabilities so as to hold on to existing customers and gain new ones.

In addition, many new products have appeared in the past few months. After almost a year during which IBM grabbed most of the headlines, Amdahl unleashed its Model 4725 to go head-to-head with IBM's 3725 and others of the same ilk. Amdahl claims that the 4725 is twice as fast as the IBM offering and less expensive.

Almost two months earlier, NCR Comten last year announced its 5620XP, a powerful communications processor also aimed at the 3725. The 5620XP is rated as more than twice as powerful as the previous models of the superquick 5620. Earlier in the year, NCR Comten enhanced the attractiveness of the 5600, 5620, 3695 and 3690 communications processors with the release of Version 4.0 of its Advanced Communications Function/Network Control Protocol (ACF/NCP). With a 23-bit addressing field, ACF/NCP increases the number of addresses available within a Systems Network Architecture network to more than eight million, against 65,000 with conventional 16-bit addressing.

The past year also saw the emergence of the channel extender. This unit allows host processors to pass information directly to each other on a channel-to-channel basis and permits remote terminal devices to attach directly to a host computer channel, bypassing the communications processor. So effective are channel extenders in a terminal environment that one user, a manufacturing concern, was able to reduce the number of host-resident data centres in its network without sacrificing performance. As the network manager put it: "The users still think they are connected to a local host when it is actually eight kilometres away."

> *‘Users still think they are connected to a local host when it is actually 8km away’*

In its June 1987 product announcements, IBM promised relief for NCP users wanting to change configurations. Eventually, users will be able to add terminals, lines and new transmission routing information to NCP definition tables without shutting NCP down first.

Things were also active in network processor land. Control Data introduced the XN10, a unit that functions as a communications processor and can link devices directly to a host processor block multiplexer channel at 3M-bit/sec. The devices attached to the XN10 look like LU6.2 PU5 units to the host.

CDC also souped up its Datanet 8/20 and 8/30 by giving them a Megalink data-handling capability. While that will certainly enhance throughput, the limitations of the communications protocols might steal some of the thunder. Most protocols are set up for transferring data in terminal mode, and, therefore, the block sizes are smaller and the protocols do not handle data as efficiently at speeds above 256K-bit/sec. These limitations plague all communications processors.

The aforementioned new products from Amdahl, CDC and NCR Comten reflect aggressive price and performance. All three are faster than previous models and less expensive in terms of performance.

Wil Marshman, marketing manager of communications products for Amdahl, says the SNA market will remain a price/performance battleground but users are looking for more functionality and diverse systems connectivity. "LU6.2, PU2.1 and Open Systems Interconnect will become big factors in the near future," he predicted.

To make their products more attractive to a larger portion of the market, many communications processor vendors have added X.25 interfaces for public packet networks and IEEE 802.3 and 802.5 support to permit interaction with local-area networks. Some have also announced support of Transmission Control Protocol/Internet Protocol (TCP/IP) or OSI to make their products compatible with diverse systems.

NCR Comten's director of marketing, Eric Birkeland, said his company was committed to OSI because "customers want connectivity among different vendors, and OSI is the way to accomplish that." He said most vendors realised this and were working toward implementing OSI. "It is going to take time, since all levels of OSI have not been defined yet, but open systems are a good marketing opportunity, and vendors cannot ignore that."

Megalink interfaces also are being dangled in front of customers, but potential buyers should make sure the communications processor has the horsepower to handle data in the 3M-bit/sec range and still provide acceptable performance. "A lot of processors get bogged down at T-1 (M2) rates, and performance suffers," said Dave Passmore, a principal with consultancy Network Strategies.

Even if the processor handles M2 and higher rates efficiently, the communications protocol it labors under may not. Since most protocols are designed for low- to-medium speed traffic (up to 256K-bit/sec) and are not efficient at higher speeds, companies with applications requiring high data rates are looking at bypassing the communications processor and doing direct host-channel communications. The device that allows that is the channel extender.

> *‘Direct channel attachment sounds simple, but requires extensive programming, especially with diverse hosts’*

Channel extenders are being sold by such companies as Paradyne, Network Systems, NTX Communications and KMW Systems. They are available for linking host processors and permitting terminal devices to attach directly to a host channel without going through the communications processor.

While direct channel attachment sounds simple enough, such interfacing requires extensive programming. "That is especially true with diverse hosts," Passmore cautioned, "since it might require modifying the operating system. Otherwise it usually involves modifying Vtam tables. While that is not as difficult, it is still a job for a systems programmer."

Messing around with operating systems and communications software is an invitation to disaster, and the host processor vendor likely will not look kindly on it either. Even if the job is done right, the vendor might require the user to back out all changes before modification or troubleshooting can be done.

Channel extenders can also increase interactive performance by allowing users to bypass the communications processor. Paradyne's Pixnet-XL is one of the better known terminal-to-host channel products and allows devices that usually attach directly to a local host to communicate with a remote one while giving the illusion that they are still locally attached.

One user confirmed that Paradyne's pitch is no exaggeration. This Pixnet-XL customer, who asked to remain anonymous, works in a principally IBM 3270 shop running Model 3800 laser printers. The IBM 3274 controllers are interfaced to Pixnet-XL, which are linked to data centres through M2 multiplexers. The Paradyne products have allowed the shop to remove five data centres, with no degradation in service.

"We still have seven different locations with 3270s, but only two data centres are needed to service them. Our longest Pixnet-XL run is 1000km, and the shortest is 10. We have heard no complaints about degradation," the user said.

The Pixnet-XL also allows host-to-host direct channel communications, but it does not operate as a streaming device. According to Paradyne, the data is transferred at 32K-bit/sec for the MVX operating system and 64K-bit/sec for MVX/XA. These speeds are considered too slow to transfer large files efficiently.

Will channel extenders mount a threat to frontend processors? "They are certainly competition for high-speed point-to-point applications, but they cannot handle gateway functions, and they do not do switching among processors," said Birkeland. While channel extenders cannot perform channel switching the way communications/network processors do, they can be configured with separately targeted channels to feed more than one host.

Vendors are attempting to attract customers by offering multifunction products, increased transmission speed and connectivity. As the accompanying comparison chart shows, many of the units can operate as communications and network processors by swapping software, control logic boards and, in some cases, I/O interfaces. Most vendors also allow their products to be field-upgraded with more memory, I/O channels and links to host processors.

In determining line support, users should keep in mind that the line-handling capacity of many products is halved under full-duplex, V half-duplex, operation. The speed of the transmission also adversely affects the number of lines that can be handled. For this article, the total number of lines shown in the comparison chart reflects half-duplex operation and the lowest operating speed, typically 1200 bit/sec.

Network processors do not usually differentiate between I/O lines and host links, and users are free to configure them to suit the application. Therefore, the column headed "Host interface ports" in the chart contains a "not applicable" indication, unless the vendors specified otherwise.

● *John Hunter is president of TMS Corp, a telecommunications consulting company and contributor to* Network World, *our US sister publication.*

Communications processors

Vendor	Model	Product type	Host computer	Host interface ports	FEP emulated	Number of communications lines	Highest rate per line (bit/sec)	Protocols
Advanced	ACS 9310	FEP	IBM System/370, 43XX, 3XX	1	NA	1	3M	IEEE 802.3; TCP/IP
Amdahl	4705T	FEP	Amdahl 470, 580, 5890, IBM System/360 /370, 43XX, 30XX	6	IBM 2705, 3705	448	64K; 90 lines at 1.544M	Asynchronous; IBM BSC SLDC; HDLC; X.25; X.21
	4725E	FEP	Amdahl 470, 580, 5890; IBM System/360 /370, 43XX, 30XX	6	IBM 3725	256	256K	Asynchronous; IBM BSC; SDLC; HDLC; X.25; X.21
Case Communications	DCX 850	NP	Any	NA	NA	240	72K	Asynchrous; IBM BSC, SDLC; HDLC; X.25
Century	OSI	FEP, NP	NCR Comten 85XX, 98XX	3	NA	21	19.2K	Asynchronous
Chi Corp	CCP/3212	FEP, NP	Unisys 1100 or any mainframe supporting TCP/IP	8	Unisys DCPs	112	64K	Asynchronous; IBM 3270 BSC; X.25; TCP/IP; Unisys UTS; 802.3
Codex	6510NP	NP	Any	23	NA	24	64K	X.25
	6760	NP	Any	4	NA	256	19.2K asynchronous	Asynchronous; synchronous; IBM BSC, SDLC; HDLC; Unisys Poll/Select; NCR Comten DDCMP; Honeywell VIP
Computer Communications	CCI 8400 T1	FEP	IBM System/370, 43XX, 30XX; Amdahl 470	4	IBM 270X. 3737	4	1.544M	IBM BSC, SDLC; HDLC
Control Data	XN 10	FEP, NP	Any IBM host supporting Vtam 3.X	16	NA	192	64K	Asynchronous; IBM BSC; HDLC; TCP/IP; X.25
	CDC Net	FEP, NP	CDC Cyber Series	2	NA	64 per module	38.4 asynchronous, 64K synchronous	Asynchronous; IBM BSC, HASP; HDLC; TCP/IP
Digital Communications Associates	3XX	NP	Any host	114	NA	114	72K	Asynchronous; IBM 3270 BSC, SDLC; HDLC; X.25, DCA proprietary
Honeywell Bull	Datanet 8/10	FEP, NP	Honeywell family	2	NA	31	56K	Asynchronous; synchronous; IBM BSC, SDLC; HDLC; X.25; Honeywell VIP
	Datanet 8/20	FEP, NP	Honeywell family	4	NA	127	1.544M	Asynchronous; synchronous; IBM BSC, SDLC; HDLC; X.25; Honeywell VIP
	Datanet 8/30	FEP, NP	Honeywell family	4	NA	255	1.544M	Asynchronous; synchronous; IBM BSC, SDLC; HDLC; X.25; Honeywell VIP
IBM	3720	FEP, NP	IBM System/370, 303X, 308X, 43XX	4	IBM 3705	60	64K	IBM BSC, SDLC; X.25
	3725	FEP	IBM System/360 Model 40 and up, System/370, 303X, 308X, 43XX	6	NA	256	230.4K	Asynchronous; IBM BSC, SDLC
Infotron Systems	892NP	NP	Any	8	NA	96	56K	Asynchronous; IBM BSC, SDLC; HDLC; Unisys Poll/Select; Honeywell VIP and GRTS
	990NP	NP	Any	15	NA	640	19.2K asynchronous, 64K synchronous	Asynchronous; IBM BSC, SDLC; HDLC; Unisys Poll/Select; X.25; Honeywell VIP and GRTS
KMW	8911A Channel Interface	FEP	IBM System/360 /370, 30XX, 43XX	1	NA	256	1.2M	HDLC; IEEE 802.3
LemCom	DNPE	FEP	IBM System/370, 30XX, 43XX	32	IBM 270X, 370X EP	1000	64K	Asynchronous; IBM BSC, SDLC
Micom Systems	MB3	NP	Any asynchronous	NA	NA	10	19.2K	Asynchronous
Microtronics Systems	LSI X.25	FEP	All DEC	5 Unibus	NA	128 virtual	19.2K	Asynchronous; X.25
	KXT-X.25	FEP	All DEC	2 Q-bus	NA	64 virtual	19.2K	Asynchronous; X.25
NCR Comten	3600	FEP, NP	All IBM hosts and selected NCR hosts	8	IBM 3705, 3725	512	64K	Asynchronous; IBM BSC, SDLC; HDLC
	5620XP	FEP, NP	All IBM hosts and selected NCR hosts	2	IBM 270X, 3725 Model 1 and 2	64	64K	Asynchronous; IBM BSC, SDLC; HDLC; X.25
	5660	FEP, NP	IBM System/360 /370, 30XX, 43XX: NCR V-8500, V-8600, V-8800, V/E-9800	8	IBM 270X, 370X	1024	9.6K	Asynchronous; IBM BSC, SDLC; HDLC
Netlink/Systech	SNA-Hub	NP	Any IBM with Vtam	3	NA	15	64K	IBM SNA/SDLC
NTX Communications	NTX 3800	NP	IBM System/370, 303X, 308X, 43XX, 9370	4	NA	4	6M	IBM SDLC-like; switches host processors
Paradyne	Pixnet-XL	FEP	IBM System/370, 30XX, 43XX	2	NA	2	2.048M	HDLC; LAP B
Protocol Computers	SmartNet 3700	NP	Any host supporting X.25	16	NA	16	64K (4 links); 19.2K remainder	Asynchronous; X.25; HDLC; LAP B
Tandem computers	6100E	FEP	All Tandem NonStop	6	NA	161 asynchronous; 45 synchronous	19.2K asynchronous; 64K synchronous	Asynchronous; synchronous; IBM 3270; Unisys UTS, Poll/Select; IBM 2780/3780; Honeywell VIP 7800; NCR 725
Telefile Computer Products	Tele-Switch	NP	Any	NA	NA	30	153.6K	HDLC
Telematics International	Series 2000	NP	Any	NA	NA	480	230K	Asynchronous; synchronous; IBM BSC, SDLC; X.25
Timeplex	Networking Microplexer	NP	Any	NA	NA	144	19.2K	Asynchronous; IBM BSC. SDLC; Unisys Poll/Select
Unisys*	CP 2000 (Burroughs)	FEP, NP	Unisys B5900, B6900, B7900	25	NA	24	64K	Asynchronous; IBM 3270, BSC, SDLC; HDLC; X.25, Unisys Standard Poll/Select
	CP 9585 (Burroughs)	FEP, NP	All Burroughs; IBM System/360 /370, 303X, 308X, 43XX	127	NA	127	56K	Asynchronous; IBM 3270, BSC; Unisys Poll/Select
	DCP 15 (Sperry)	FEP	Unisys 1100 and 2200	2	NA	48	64K	Asynchronous; synchronous; Unisys UTS; IBM BSC; X.25
	DCP 40 (Sperry)	FEP	Unisys 1100 and 2200	16	NA	1000	64K	Asynchronous; synchronous; Unisys UTS; X.25; IBM SNA; HDLC; DOD: DDN
Vitalink Communications	NP III	NP	Any	8	NA	8	256K	IBM SDLC, HDLC; X.25, Unisys BDLC; TCP/IP; XNS; 802.3; 802.5

BDLC = Burroughs Data Link Control; BSC = Binary Synchronous Communications; DCP = Distributed Communications Processor; DDCMP = Digital Data Communications Message Protocol; DDN = The US Defence Data Network; FEP = Front-end processor; GRTS = General Remote Terminal Supervisor; HDLC = High-Level Data Link Control; LAP B = Bit-oriented Link Access Procedure; NA = Not applicable; NP = Network processor; SDLC = Synchronous Data Link Control; SNA = Systems Network Architecture; TCP/IP = Transmission Control Protocol/Internet Protocol; UTS = Universal Terminal System; VIP = Visual Information Projection; XNS = Xerox Network Systems.

*Information obtained by Datapro Research Corp, Delran, NJ.

SOURCE: TMS CORP, DEVON.

Tom Amos is a partner in the Sydney comms consultancy Amos Aked Swift.

Digital voice offers

By Tom Amos

IN SPITE of the availability of facsimile and telex, voice is still the best approach for human communications. To telecommunicate productively, the voice circuits utilised must be free of frustrating noise and interference. The continuing management challenge is to provide these circuits cost-effectively.

The digital transmission of voice is being promoted by the various telephone administrations such as Telecom as the way all future circuits will be carried. The benefits are better service performance combined with lower cost structures for Telecom. Everyone wins if you, the manager, are prepared to pay the same amount as before.

Digital voice carriage is based upon the CCITT standards for pulse code modulation (PCM) of 8000 samples per second, each of 8 bits weighting, so a similar reconstruction will provide a service of equal or better performance to those already provided by the analogue network. Adaptive PCM reduces the bit rate each way from 64K-bit/sec as above to 32K-bit/sec. The costs of service provision remain essentially similar with either technique. Lower costs again can be achieved by speech coding. Digital regeneration over analogue repeating means effective, high quality long distance services.

The voice digitiser may be the solution that many communications managers are seeking. This low bit rate speech compressor converts analogue speech having a nominal 4KHz bandwidth into a 2.4K-bit/sec digital data stream (and vice versa) — in many cases with a payback period of less than one year. In addition, by using advanced processors and algorithms, the vocoder can reproduce speech with a STD-like quality.

Speech coding, the synthesis of natural sounding speech at low bit rates, can be broken down into two main categories, waveform coding and vocoders. Waveform coders try to mimic the speech waveform itself directly. Examples of these are the Telecom pulse code modulation systems and their differential and adaptive extensions.

These coders do not produce high-quality speech below bit rates of about 16K-bit/sec. Vocoders, a new development, attempt to synthesise speech using a parametric model of speech production. So the data that is transmitted is not the digitised voice itself but is the parameter values that will be used to regenerate the voice from the model. Vocoders can reduce the bit rate to much lower values than is possible with waveform coders.

Low bit rate voice digitisers have many uses. But perhaps the two most significant applications are compression of transmission bandwidths and cryptography.

Reducing costs

The primary problem confronting communications managers is meeting the diverse data and voice telecommunications requirements of business efficiently and economically. These communications requirements may include the transmission of voice, teletype, facsimile and computer data. The cost to meet these requirements is high and continues to increase as price structures change, as new facilities are added, and as the need for information increases.

The economic arguments for compressing transmission bandwidths are strong. For example, the cost of a single OTC leased line from Sydney to London can be $A12,000 a month for both ends. Thus a business with offices at both sites needing four dedicated speech circuits would have to lease four such lines at a cost of $A48,000 a month. On the other hand, by leasing only one such line and installing four voice digitisers and a multiplexer modem at each end, the business could realise a savings of $A36,000 per month after the initial six months. (There are never any free lunches, and a reduction in quality is the current price for a reduction in cost.)

This saving results from the fact that through the use of the digitiser, it is possible to reduce a data rate from, say, 64K-bit/sec compounded PCM speech to 2.4K-bit/sec digitised speech, which represents a factor of 25.

The transmission bandwidth gained through the digitiser does not have to be dedicated to more voice channels but may be used for data instead. For example, through using 14.4K-bit/sec modems, two voice circuits and one 9.6K-bit/sec-computer data link can be carried by a leased line that usually supports only one voice circuit.

How vocoders work

The vocoder usually provides full-duplex operation. It receives the audio input from a conventional telephone, microphone or similar device, which may be remotely located and switched into the digitiser via a PABX.

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EXECUTIVE SUMMARY SCREEN

Digital voice technology will not only provide better basic telephone services under the ISDN system when that network becomes widespread. It also permits private creative and cost-effective advances in existing voice networks. The use of compressed digital voice via so-called vocoders can mean the difference of paying for one leased line instead of four. Encryption of voice circuits also becomes an easy option. Secure digital voice can be sent via HF radio or satellite links at data rates as low as 2400-4800 bits/sec.

Rather than sampling the audio signal through analogue filters, which are subject to some distortion, the voice is immediately converted from analogue to digital. The digitised signal is then processed by linear predictive coding (LPC) algorithms and transmitted at 2400/4800 bit/sec. At the receiving end, the digitised voice signal is synthesised from the incoming bit stream and converted back to analogue.

The so-called pitch-excited vocoder has two basic parts: the linear filter which models the spectral shaping of the vocal tract and the excitation of that filter. The system assumes that speech can be broken down into short time segments over which the speech is stationary. During these short time intervals the speech is either voiced or unvoiced.

Voiced speech such as vowel sounds corresponds to a filter excitaton which is a train of impulses periodic at the pitch period of the speech. For unvoiced speech such as "s" sounds the excitation of the filter is white noise. The parameters that must be transmitted for this model are the co-efficients which specify the filter, the voicing decision, the pitch (if the speech is voiced) and the energy of the excitation.

After pre-emphasis LPC analysis is done on each time segment of speech to produce multiple reflection co-efficients which specify the filter. The speech is also analysed to determine if it is voiced or unvoiced. In the case of voice speech the pitch period is also determined. The final analysis calculates the energy of the speech. After all parameters have been obtained they are coded and inserted into a transmit frame along with error control and frame synchronisation bits.

The digitiser bit stream is virtually immune to noise and distortion found on standard terrestrial and satellite circuits, thus providing better quality than many long-haul international dial or alternative voice/data (AVD) connections.

Voice quality

The voice quality of a PCM 64K-bit/sec system is very good, equal to the best 4KHz analogue circuits employed by Telecom today. This is not so for the current range of LPC voice systems.

Historically, the voice quality of a low bit rate voice digitiser has been the greatest factor affecting its widespread acceptance. Voice quality includes intelligibility, naturalness, ease of listening, absence of artifacts, and speaker recognition. In addition, in the face of degraded speech input and noise backgrounds, the transmission must be acceptable.

Maintaining a high quality voice is not easy. In fact, the task is made more difficult because speech analysis and synthesis must be nearly instantaneous, with time delays greater than a fraction of a second being distracting.

The digitiser can reproduce voices with little degradation, and in the face of extremely degraded telephone input, the reconstructed speech is still generally completely intelligible. The key to this quality lies in powerful microprocessors and enhanced linear predictive coding algorithms.

The echo problem

No discussion of digital voice is complete without touching upon the problem that arises from echo caused by the public telephone system. The local telephone plant is designed around two-wire voice circuits and the same pair of wires carries both the transmit and receive signals. Hybrid transformer networks separate these two signals when four-wire circuits are required.

However, hybrids do not disentangle the transmit and receive signals perfectly. As a result, these two signals become irrevocably intertwined whenever the two-wire circuit passes through a point of mismatched impedance, and echoes will occur. Because these echoes return instantly they are always perceived as sidetones and are not offensive.

Voice digitisers introduce time delays similar to those encountered with satellite circuits. The interaction of the telephone system echo with the digitiser time delay results in a twice-synthesised echo with 0.5s return time. Such an echo is intolerable and an echo supressor at its source is required. Delayed echo is not unique to low bit rate voice digitisers: satellite transmission adds a delay of some 300ms per one-way trip or "hop". Thus for calls routed via satellite, echo suppressors must be used. (In the worst case these calls can become almost half duplex.)

Digitisers usually feature an echo canceller and an adaptive echo suppressor, which measures the strength of the uncancelled echo residual and lessens the suppressor's influence if the echo is not severe. The adaptive mechanism guarantees that those calls where the echo is mild are not burdened with an over-anxious suppressor.

Because the digitiser digitises voice, its output can be easily encrypted. This digital approach is far superior to analogue encryption methods now in use and provides natural voice quality. The low digital transmission rate of 2400/4800 bit/sec allows digital secure voice even on a switched dialup netork, high frequency radio or satellite links.

Digital voice is a technology which promises to provide not only better basic telephone services with more available features as Telecom introduces the ISDN system, but should allow for private creative advances, at low cost, in the voice network area. It also heralds the use of bit-rate compression techniques which are limited only by the processing speed of lowcost computers with information content of a typical speech path under 1000 bit/sec. (I know some who would not even register!) Maybe the current new PCM voice systems are only a transition phase to even more efficient bit compressed cost effective voice networks.

- *Tom Amos is a partner in the Sydney-based telecomms consultancy Amos Aked Swift.*

Managers, take note . . .

By Eric Schmell

REMEMBER the first time you heard your own voice played on a tape recorder? Most people recall the event with shock: "I sound like that?"

Yes, you do. That is the sound you utter without the familiar resonance of tissue and bone that you normally hear reverberating inside your skull.

Technology has allowed us to expand Robert Burn's famous dictum. Now it is also a gift to hear ourselves as others hear us.

This lesson should not be lost on communications managers. They have a similar responsibility to call up and listen to their organisation as it sounds to the public.

What kind of delays, indignities, frustrations and blockades await people who try to speak to someone in the company? The manager might ask after a few simple tests, "We sound like that?"

These tests require no sophisticated network hardware or software. Put away the Erlang B tables (at least for now); unplug the datascope; do not worry about Netview for a while.

The manager should approach this experiment with the simplicity of his telephone, as just another caller trying to reach someone in the organisation — just like the rest of the world.

The first stop is the private branch exchange operator. How many rings had to occur before an answer? Try it again during the busy hour, when the switchboard first opens and right before closing. Note how long each delay is, and seems.

Next, test the operator's official greeting. Does it sound official? What about the operator's tone and enunciation? Now mumble someone's name or department and appear confused. Test your operator's patience and tact. After all, the calling public certainly does.

Assuming you make it past the first line of communications barriers without being appalled or too discouraged to continue, the next level must now be put to the test: individual departments. Listen once again for how long it takes someone to answer the line. Try the same tactics by calling during busy times, the lunch hour and close of business.

Act confused and unclear about who you are tryng to contact to test the mettle of secretaries and others who respond. If you encounter a voicemail system intercept, go ahead and challenge it. See if the greeting seems clear and the instructions are easy to follow. Try to escape its embrace and reach a human being again.

Of course, the PABX is just the first obvious jumping-off spot for these tests. If the organisation maintains another public interface — such as a Help Desk, claims operation or customer service centre — they too are fair game for similar assaults on their integrity.

The results of these probes into the heart of the communications complex should be more revealing than any cold statistics printed off by a PABX. The strengths and shortcomings will be a mixture of technical and human factors that elude the grasp of any diagnostic machinery.

- *Eric Schmall is network systems manager for an insurance company.*

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The voice-data battle

By David Beynon

A LEADING Australian communications manager recently painted a woeful picture of the status of the voice manager (VM) within the corporation. This neglected professional, he said, typically operates as a one (or two) man/person band facing endless hassles related to "cost justification of the arcane and intangible" from a less-than interested upper management which would appear to believe that voice managers are "there to make sure the telephone on the desk gets a dial tone".

To see if voice managers indeed fit that image, *Communications World* surveyed several corporations within the banking, insurance and transport sectors. Not surprisingly, it was impossible to form a "typical profile". We did, however, come across several disgruntled voice managers, some of whom were in the midst of civil warfare against their data counterparts.

Others, usually from organisations which have combined voice and data management groups under a manager of information services (MIS), generally described their resources "as adequate, if not good". On the other hand, the manager of the voice department in a minor bank described his operation as "precisely a two-man band".

This VM hardly knew where to begin when asked if he could give specific examples where lack of upper management support resulted in inadequate voice installations. He began with head office, where administration was dispersed over three buildings following a merger. The organisation obviously needed a major PABX. However, under the squeeze of tight budget constraints, the previous VM was forced to tie-line connect the existing three separate Philips PABX systems.

In this configuration the previously adequate inhouse voice network was hopelessly overloaded, and as might be expected, complaints of line drop-outs and phantom calls followed quickly — from as high up as the general manager himself.

It seems "the wheel must drop off" this corporate voice network before its manager's pleas register in the upper echelons. No doubt to the joy of this institution's competitors, the needed capital for an upgrade is not forthcoming (so much for wielding communications as a strategic weapon!).

Historically, the communications manager was a voice manager, who reported to general administration. He or she is now vulnerable to takeover bids from the MIS department. A recent survey of 50 comms managers in the US has revealed a significant trend: more than 50 per cent of them now report directly to the MIS manager, who in turn has direct access to board and general manager.

Under the MIS umbrella the voice manager is no longer a "lone ranger", but now has access to the resources that come with being part of a team which fully utilises and appreciates his or her services. With data staff and voice staff weaned on similar technology, this is supposedly a natural and beneficial union — so the story goes.

A large Australian insurance company has taken a lead from this American trend. According to its comms manager, "once the data branch was a force, and in place under the MIS, merging of the voice guys came easy". Although "merged", the department still has discrete but "interchangeable" voice and data staff who make up "a small, but capable team of 10".

Interestingly, the Information Services Department (ISD) is now exposed to monthly scrutiny before a newly formed ISD board. This board, which is filled by divisional managers, also provides a much valued forum in which the comms manager can air grievances and discuss proposals.

Bitter struggle

The VM for a major bank made it clear that the merging of voice and data management is anything but part of Australia's bicentennial history. Our voice source revealed a bitter data vs voice power-struggle in which the winner takes all. The prize is control of the future ISDN-based comms network.

Reportedly, the data chief has made presentations to upper management criticising "the lack of expertise" in the voice area. Other frontline tactics include not supporting voice group moves to get a new ISDN-matched Tims (telephone information management system) up and running.

Asked why he thought the data guys were playing so rough, the VM replied: "they fear extinction in the event of the voice department putting ISDN PABXs in place first". With data consuming ever-increasing amounts of the comms budget, it could be said that our voice source was being slightly optimistic.

To bolster the autonomy of his voice department, this manager is negotiating the implementation of "local costing". This move would entail internal billing of all voice network users direct to the telecommunications department, thus at one stroke converting this area into a profit centre. With the proposed local costing would come the flexibility to levy at a rate commensurate with service and the capital needed for network development.

Australia's biggest betting terminal manufacturer doesn't gamble on modems

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Users face Lan dilemma

By Andres Llana

LOCAL-AREA neworks provide management support with the opportunity to place minimally configured personal computer workstations on users' desks while letting them share more expensive peripherals.

Almost no one starts out that way, however. Usually, it's the other way around: most users think about local nets only after they are faced with a proliferation of personal computers and expensive peripherals.

The object of a local-area network is to make more effective use of the user's personal computer resources. Unfortunately, most local nets do not reach their full potential until they have been configured with a gateway that lets users exit to other local nets and other systems, such as mainframes. Therein lies a problem for some established users, who must dedicate their heavily configured personal computers as gateways.

PCs "Lost"

Before integrating their personal computers into a local net; few users give much consideration to issues relating to net configuration and functional structure. During the net implementation process, therefore, these users may be surprised when many of their fully configured personal computers become dedicated to net-related functions, and the personal computer's resources are no longer available.

This is particularly true when newly networked personal computer users still require access to a mainframe. The net manager soon finds that some personal computers must be surrendered for service as dedicated file servers, print servers and gateways.

A personal computer may be set up as a multifunctional gateway, which provides access to more than one local network or computational resource, such as a mainframe. But if the gateway software supports both local net and mainframe access, for example, users soon find that usable random-access memory is eaten up by Ram-resident software and associated buffering requirements. The personal computer is unable to support more than one gateway and may be useless even as an alternate workstation.

The local network software can demand up to 80k-bytes of active memory, while the basic requirements for the MS-Dos operating system is 30k to 35k-bytes of Ram. When users add the needs of the multifunctional gateway server software, an additional 164k-bytes of Ram may be used up. The gateway server, overloaded with operational software, can no longer serve as a workstation.

The personal computer can serve as a basic gateway connecting to one other environment but cannot serve as both a mainframe gateway and a connection between local nets, due to the lack of machine resources.

Gateway card

Another alternative users have is to implement the gateway function in hardware via a multifunction board. Numerous local net gateway function boards on the market support multifunctional gateways, and they do not use up personal computer memory as current software solutions do. However, these solutions require adding expensive hardware that overlaps functionally with the user's current emulation boards.

For example, users whose personal computers are equipped with Irma cards are faced with a dilemma. They can either discard their emulation board in favor of buying still another function card, or they can seek a software solution that will dominate the resources of the personal computer.

So far, the software solutions now on the market that are aimed at supporting a multi-gateway function use too much memory. There is a need for more efficient software products that not only support multifunctional gateways but can also interface with all existing local net server software offered by the main local net vendors.

If local networks are to become the cost-effective networking solution they are in theory, then new software solutions will be required. There will always be purveyors of hardware solutions; however, if the concept of local networking is to become as popular as it can be, then new vendors will have to emerge, with a renewed interest in the software side of local net development.

The current situation presents a dilemma to users that do not wish to scrap older, proven emulation boards for other gateway boards. In addition, users installing personal computers should think in terms of their future plans for network access and their possible involvement in local nets. These users should give careful consideration to current and future system configuration to ensure that they do not develop a series of incompatible terminal arrangements.

- *Andres Llana is director of consulting services for the Vermont Studies Group.*

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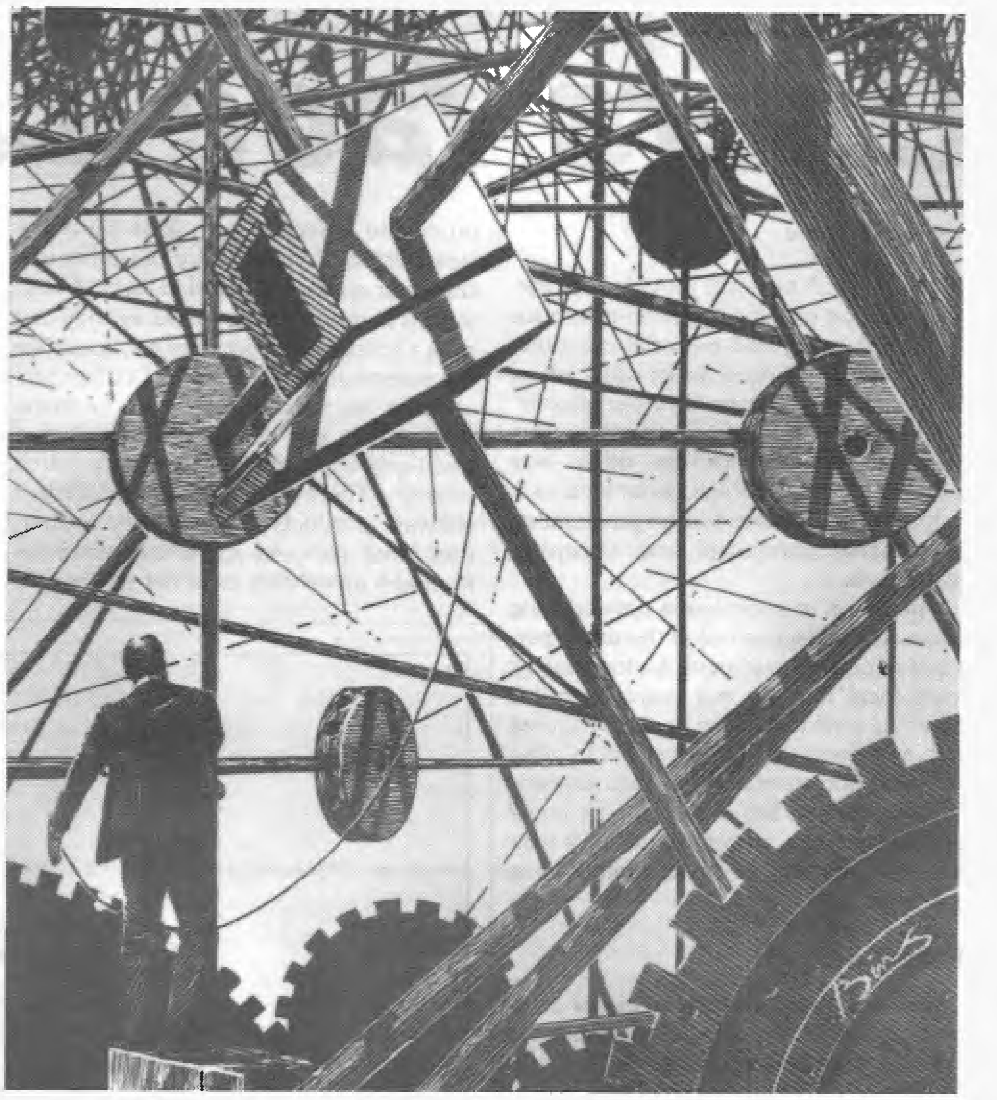
NS004

The best-laid Lans of mice and men

Choosing a local network is not easy, Mark Leopold explains



LOCAL area networks are becoming more and more popular. Where once only large organisations with a multiplicity of computing equipment went in for networking, now Lan producers are stressing the benefits of linking up for virtually everybody.

But is your Lan really necessary? And what sort of Lan should you buy?

The basic argument for networking is simple. In a highly automated organisation, every department has its own computers, its own software, its own databases. But the odds are they can't communicate.

The obvious way out is to link the equipment so that files, software and terminal equipment can be shared. But this is not as simple as it sounds. Plugs and sockets do not match, software packages and file structures are incompatible, operating systems and systems architectures fail to recognise each other.

But the decision to interconnect is only the start. The next question is which of the three main Lan topologies is required. The first configuration to be developed was the star, in which several terminals surround a controlling host computer.

The problem is the whole system depends on the host. A failure will make the entire system crash. Also, all traffic between terminals has to run through the centre — an inherently inefficient set-up.

To avoid this drawback, scientists at Cambridge University developed the ring configuration, a closed loop connecting a number of terminals to each other. The Cambridge ring used one terminal as the controller; the later token ring system has each station taking control of the network in rotation.

With either ring, however, the system is dependent on every terminal; break the ring at any point and it fails.

The latest Lan configuration is the bus, in which terminals are connected to a certain main cable, producing a circuit wired in parallel, rather than in series like the ring. This minimises the dependence of the network on any one section, but maximises the amount of cabling.

Offices are thrown into turmoil while new leads and ducts are installed. Some organisations find it much easier to interconnect terminals using existing cables — the telephone system — rather than instal a Lan.

Such a network uses the company PABX to switch the data. The problem here is that intensive use of a PABX-based system, for example any high-speed data transfer, will clog up the system, bringing voice as well as data communications to a standstill.

Ultimately, powerful, integrated PABXs will switch voice, data and even video signals, both within a site and around the world. Such an integrated network — the ISDN will render Lans almost obsolete.

For at least the next 10 years, however, the only solution for anyone requiring intensive data transfer will remain the Lan.

The complexities of the local-area network world, however, mean that intensive thought must precede the selection.

Key factors to be considered include the ability to connect different kinds of terminal equipment, both internally and between sites; the prevailing standards for the hardware and software being evaluated; and the availability of vendors and interfaces.

The following points need to be thought through:

■ Ease of installation and use: how long will it take to instal the network and get it up and running? Can inexpensive wiring be used? How will the cabling fit in with existing cables? Does the supplier provide easy to understand documentation?

■ Reliability: does the supplier provide post-sales support and back-up services? What are the expected maintenance requirements? What is the company's track record?

■ Application capabilities: will the product provide the required applications and anticipated future applications? Will the network expand easily to meet future needs?

■ Features: does the product have the necessary features to meet needs such as bandwidth, topology, speed, response times, error checking and security? Does it provide electronic mail and messaging facilities?

■ Extras: will dedicated devices be necessary to run the network? Will it need adapter cards which will take up expansion slots that may already be full on some machines? What kinds of cabling and other peripherals will be needed to get the network up and running?

■ Cost per node: what is the total cost per node for the entire turnkey package? How does this compare with competing systems?

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Cut-off point at 5km

By Paul Kelly

THROUGH Lan technology, diverse facets of a single organisation, such as the office, factory and laboratory, can be linked for immediate communications access. The micro-communications interface that results from high-performance networking can enable the group productivity of an enterprise to be increased at an affordable cost.

As far as personal computing is concerned, networking and communications can be considering in terms of the following categories:

- Wide-area communications, through which public networks enable computers to communicate across any distance.
- Local-area networking to interconnect PCs, hosts and peripherals within a single building or group of buildings.
- Host gateways — enabling PCs to communicate with host computers through terminal emulation or file transfer.

PC communications essentially follow mainframe-based data communications standards and users are advised to have a clear awareness of these standards and how they relate to PC technology.

Key advantages of local-area networking are the facility to share common disk files and peripherals among clusers of PCs using file and print servers and the ability of PC clusers to inter-communicate or interact with host computers at high speed. Some broadbank Lans can carry live video signals.

Through the use of file servers, multiple access to databases as well as software and electronic mailbox facilities can be provided.

Optical-fibre is emerging as a viable alternative to the conventional forms of cabling for local area networks. Factors users should consider in evaluating this alternative are safety, noise, immunity, weight and size. Depending on the specific application in question, optical fibre can be more cost-effective than conventional cabling.

For networking within a radius of 5km, a Lan is likely to be appropriate. The ISO/OSI model remains the common standard, but a multitude of Lans abound within it, Popular examples are Starlan, Token Bus and Token Ring, Ethernet and PC-net.

Perhaps the most difficult dilemma users need to resolve from the outset is the extent of their computing needs. It is often difficult for businesses to ascertain the likely future growth of their operations.

Certainly, if systems security and integrity are seen to be important, a multi-user system may well be the obvious option. Only minimal security is offered through networked PCs, as data is stored on disks, and the variety of components used with PC systems can mean that service and support is a problem. •

● *Paul Kelly is sales manager with Austral Data Networks, which markets a wide variety of networking components based on the Isolan range from the UK.*

The age of network computing

By Eric Killorin

FIRST there were multi-user systems, a time-sharing approach that allowed terminal users access to a centrally located mainframe. Then came proprietary networks for moving information within a single vendor's family of computers.

Soon local-area networks became the buzzword for lower level datagram services that allowed resource and information sharing among computers from different vendors.

Now, Apollo Computer is attempting to establish its concept of Network Computing as the next generation of computer networking. What is Network Computing and what does it mean to local-area network planners?

First, remember that local-area networks allow users to share files and documents with and send mail messages to other users whose equipment is connected to the same network, either directly or via a gateway. Middle- and upper-layer services extend the functions of local networks but are implemented so they do not compromise users' investment in the lower level services, that is, Ethernet.

Network Computing not only lets users share documents and expensive peripherals, it offers much more. It makes computers connected to the local-area network acts as shelves of a user's application. With Network Computing, a complex application can be divided into discrete modules for processing on nodes best equipped to handle that part of the application.

> *A complex application can be divided for processing on the best-suited nodes*

For example, a three-dimensional solids modelling application may have a series of complex mathematical formulas that would best be handled by a Cray supercomputer or large IBM system. The graphics representation of this program could be handled by a specialised parallel processor, and the what-if scenarios could be handled by a Vax, Microvax or a minicomputer with idle capacity.

Network Computing is distributed processing or, more appropriately, network resource management in its ultimate guise. It balances the processing load of networked computers based on the requirements of the application.

The end result is more efficient use of CPU cycles and faster application processing.

Instead of boosting network throughput to speed network transactions, Network Computing solves the bottlenecks right at the CPU. It queues jobs only to processors that can understand, perform and return the application with the greatest combination of speed and efficiency.

I'm not so sure I like this new network faultfinding software.

Apollo's Network Computing arrived a year ago, but already it is showing promise as a solution to the sophisticated requirements of the technical community. Lofty goals are expected of Network Computing, not the least of which is Apollo's ambition to have it accepted as an industry standard.

Network Computing Forum, a consortium of 76 users, vendors and other interested parties, hopes to keep the concept of Network Computing alive and well and very much on the agenda of the Corporation for Open Systems (COS).

Apollo rival Sun Microsystems is a member of the Forum, and so is Digital Equipment Corp.

Add several heavyweight users and you wind up with a team of players whose collective thinking could shape much of the standards activity in local-area networks.

Network Computing is not without its faults. The concept, and especially the implementation, is far from a mature enough stage to be adopted outside Apollo's very specific Domain environment.

The overhead associated with Network Computing may relegate it to performance-minded users, not the cost-conscious users that characterise the low end of the local-area network market.

Still, the utilities that support Network Computing could be shaped and molded to just about any environment, effectively giving users with other application needs a way to get the most out of their local-area network by getting the most out of their CPUs.

● *Eric Killorin is the publisher of* Netline, *a newsletter on computer networks.*

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NS005

Multi-host connectivity issues

CPU-sharing gives network experts a new challenge

By a Special Correspondent

A DRIFT from single vendor environments in the corporate sector has created new criteria for connectivity in business.

The drift has been brought about by a number of factors: the increasing power and versatility of PCs, including those used on Lans and Wans; the matching of new hardware and software to achieve optimum results; computerisation in various departments with different requirements; take-overs and mergers where it has become necessary for different brands to operate in harmony.

Much new hardware has come into being in response to specific areas of development, making the task of advanced corporate connectivity more complex and demanding more ingenuity on the part of designers and managers

Ian Fazio, managing director of the Melbourne-based Shuttle Group of companies, said this need for highly sophisticated communications and connectivity is one of the most significant challenges being faced in computerisation.

"It is no longer a matter of simple modern communications, networking or wiring management," he said. "All of these areas, and more, have become intricately interwoven to create the connectivity issue."

Fazio points out that while connectivity of PCs is usually far from the main issue, in the mainframe market there is a growing need to share resources of different host CPUs along with the need to provide different methods of access to these CPUs.

This situation has been addressed, to some extent, by Token Ring and Ethernet solutions. An alternative would be to employ a data switch such as Shuttle's CX-80.

Apart from handling different physical interfaces, the CX-80 takes care of protocol conversion with more than 100 Ascii terminals already recognised, and thus converted to handle 3270 terminal sessions.

"If you consider this flexibility in a multi-host environment, for example IBM/Vax, you can have one terminal (VT220 or 100) accessing either host. This also could be done by a PC running a reliable terminal emulator.

"This approach gives greater utilisation of resources and significant cost savings," Fazio said.

Another typical problem would be a corporation which might be running an IBM or Fujitsu SNA host with the need to connect to Tandem, Honeywell, DEC Vax and Prime hosts, as well as a variety of PCs.

In such a situation Novell Advanced Netware opens an enormous variety of solutions in PC networking for the large corporation.

Individual Novell networks can be connected via bridging software and hardware, between floors or even buildings, through sophisticated wiring management or via modems as with X.25 systems.

In turn, Novell Lans can be connectd to various types of hosts by further hardware and software.

By addition of an integrated circuit card (which stimulates an IBM 3274 Cluster Controller) and SNA (or Bisync) software and Netbios Lan Gateway software, a Lan can be connected into an IBM (or IBM-compatible) host.

This means that any PC on the Lan can run IBM host applications through one gateway simply by toggling and "hot-keying" back and forth to Dos.

This also can be achieved, by similar methods, into the IBM System 3X, the Sperry (Unisys) and Vax or asynchronous host environment.

Corporations need to be aware that it is much less expensive if their PCs are to be connected in this way rather than a one-to-one coax hook-up.

It also gives them much more versatility, functionality and control of their resources, plus the added benefit of being able to connect remote sites to head office sites.

This will create a system where

- PCs can be connected in various topologies to a file server (containing all programs and files) with Novell software creating a local-area network.
- Multiple Lans can be connected via bridging methods to create wide-area networks.
- The Lans or Wans can be connected via various software and hardware configurations into various types of hosts including IBM SNA or Bisync, IBM System 3X, Fujitsu, Unisys, Honeywell, Vax or Prime.
- PCs on Lan can communicate with an IBM host by running one software package, and that same PC can communicate with a Vax system using another software package. This creates a versatile multi-host accessibility. Files can be transferred from these hosts, stored on the file server and then accessed by anyone on the Lan possessing security rights.

The total wiring management of an installation can be vital in developing a system of connectivity that achieves optimum power, versatility and utility.

By utilising twisted pair wiring in place of the vastly more expensive coax flexibility can be achieved at a significantly reduced cost. Such an approach provides a modular solution to both data and voice.

FAX-E-MAIL
E-MAIL-FAX

Facsimile use is still growing by leaps and bounds in Australia and all over the world. New and increasingly capable Group 3 machines are hitting the market at regular intervals as user demand entices new vendors -nto the arena. Waiting in the wings for widespread ISDN availability are the latest Group 4 machines with 3-4 second/page transmission at better resolution. The 70-odd models of standalone Group 3 machines now on the local market are complemented by an array of facsimile cards for personal computers. While they don't pose any serious threat to the standalone machines, they are ideal in special applications such as PC-to-PC exchanges of image files from popular CAD and paint programs, as hubs and gateways in the corporate WP system and so on.

Facsimile has largely eclipsed electronic mail in the public eye, but behind the scenes there's a flurry of international activity to set up a standardised worldwide e-mail network. The new CCITT X.400 Message Handling System (MHS) standard offers crossover from e-mail to fax and telex to and from the user's PC. Supersmart international directory services will make it a snap to find who does what, and with which, and to whom . .

These two topics will form the **CORE REPORT** in the March issue of Communications World. Editorial contributions are welcome and may be discussed with the editor/publisher, Luis M. Huesch, on **(02) 439 5133** or **(02) 960 3710**.

For advertising enquiries please contact the national advertising sales manager, Terry C Swan, on **(02) 439 5133**.

COMMUNICATIONS
WORLD

Multi-Lan links heat up

By Elisabeth Horwitt

LOCAL area network bridge vendors have launched the new year with introductions that address their customers' need to link geographically dispersed Lans — without overwhelming their telecommunications budget. "The Lan-to-Lan T1 (M2) bridge is hot," according to Gartner Group analyst Joaquin Gonzalez.

He was referring in particular to a new generation of intelligent bridges that provide increasingly efficient ways for users to connect multiple Lans over Megalink-type pipes. This breakthrough in bridges could provide a healthy boost to the M2 market, he added.

Until recently, companies that wanted to interconnect multiple Lans over remote links had to choose between bridges and routers. While a router can send a message directly to the right destination, a bridge must broadcast the message to all networks — at least the first time around. (Several vendors' bridges reportedly remember a node's network address after the initial sending.)

But while bridges are protocol-transparent, most routers can handle only one type of networking protocol, such as Decnet or TCP/IP.

This limitation was one of the main reasons General Motors/Hughes Electronics chose bridges to interconnect a multi-site Ethernet system that currently supports some 64 protocols, according to Jack Covert, head of technical support services at Hughes.

> *The new bridge-router hybrids target companies with smaller bandwidth budgets and fewer networking protocols*

Covert admitted that the bridges on Hughes' network sometimes need to broadcast messages, which can use more bandwidth than if the system used routers. However, wasted bandwidth is not a major concern for the company, which guarantees acceptable user response time by linking all major sites with dedicated lines that support a rate of at least 64K-bit/sec, according to Covert. So far, network use reaches only 12 to 14 per cent at peak hours.

The new bridge-router hybrids target companies with smaller bandwidth budgets and fewer networking protocols than Hughes has. Halley Systems, of San Jose, California, is expected to announce one such product, Connectlan, this month.

The device reportedly can act as both a protocol-transparent bridge and an intelligent router that will support TCP/IP now, and the ISO's Open Systems Interconnect and possibly other protocols later on, Halley said. Connectlan also offers more efficient use of available long-distance bandwidth by allowing multiple Lans, as well as voice devices, to share one T-1 link.

Multiple Lans within one building or area can communicate over Connectlan's broadband backbone. The product will also feature a graphics-based network management system, Halley said. Prices were unavailable.

Vitalink Communications Corp last month announced two products that address the demands of companies like Hughes for "true Ethernet speeds" across Lan-to-Lan bridges, Covert said.

Two new members of Vitalink's Translan bridge line are said to support up to 3M-bit/sec throughput in both directions.

The products can select the most efficient route from among alternate network paths and also dynamically switch transmission to a different route in case a line is down or overloaded, according to Vitalink.

Vitalink's Translan 350 connects Ethernet networks supporting either Xerox's Network Systems (XNS) or TCP/IP protocols. The Transring 550 links token-ring networks across synchronous, high-speed lines ranging from 56K-bit/sec to Megalink rates. Both products are said to support up to two trunks.

Priced at $US18,500, the Translan 350 and Transring 550 are expected to become available in April.

Another bridge router device that supports multiple T1 lines was announced late last year by Wellfleet Communications in Bedford, Mass. The Link Node and Concentrator Node communications servers provide routing functions for TCP/IP or Decnet devices and bridge transparency for other protocols, according to Mark Strangio, the company's director of product marketing.

"And if IBM gets its stuff together, we will support LU6 2 and the Token-Ring down the road," Strangio said. The products also allow multiple Lans to share a high-speed line with voice devices, he added.

The Link Node can support up to eight T1 lines and eight Ethernets.

- *Elisabeth Horwitt writes for US Computerworld.*

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Personal Computer Support – Network Solutions' Bridge CS/1-SNA lets IBM and compatible PCs attach direct to the LAN and by using Bridge's PC3270 software, emulate 3278/79 terminals and transfer files. PC users can then send and receive text and binary files from VM/CMS, TSO, and CICs on the IBM host. **Host**

Interfaces – CS/1-SNA connects direct to front-end processors or uses telecommunication lines – both at speeds from 1200 bps to 64 Kbps.

Terminal Support – CS/1-SNA supports most popular ASCII terminals and IBM-compatible 3278 and 3279's.

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NS005

How will Lans fare under the ISDN?

Charlie Bass discusses the impact of the new network

THE most commonly asked question regarding the relationship between Integrated Services Digital Networks and local-area networks seems to be: "Will ISDN put local-area networks out of business?" Local-net aficionados usually respond head-on with: "Of course not. We are not even in the same business."

While ISDN will not put local-area networks out of business, the transition of the telecommunications infrastructure to an all-digital standard will challenge many current assumptions about voice/data communications.

There is no question that ISDN will revitalise the position of PABXs in data communications. Users accustomed to the restrictions of voice-grade circuits will have access to faster, cheaper and more reliable services through primary and basic rate interfaces.

Will this revitalisation allow the PABX industry to capture more local data communications? Certainly. Does this revitalisation represent a fundamental change in the applicability of PABXs v local nets? Certainly not.

Data communications is typically supported by one of two computing models. The traditional, prevalent model involves interaction between a remote user and a host processor. The user might be a terminal or an intelligent workstation in terminal-emulation mode. In each case, communications is supported by a circuit operating at modest data rates (less than 64K-bit/sec).

The second, newer model involves multiple intelligent devices sharing information or resources through common servers. The communications requirements in this case may be circuit- or transaction- (datagram) oriented, with high data rates (greater than 1M-bit/sec). In terms of circuit connectivity, potentially large numbers of circuits (greater than 1000) need to be created and maintained through the network to each station (greater than 32) and server (greater than 128).

PABX-like switches are suitable for supporting the host computing model and will be increasingly competitive in this arena when upgraded to ISDN standards. In addition, the market will be stimulated simply by the existence of a data communications standard.

However, the server computing model is the native domain of local-area networks. Local-net technology was conceived to support this model. Current PABX architectures are not suited for this transaction-oriented, highly connected, high-speed environment.

Given this dichotomy of computing, the available market for PABXs and Lans depends on the prevalence of the respective computing models. While the host model is the older and prevalent model of computing, the server model reflects the growing use of personal workstations and hierarchical networks. While both models will endure, the server model is emerging as the one more likely to dominate the market.

Accepting the future survival of Lans, how will ISDN affect their nature and use? First, there is some chance that ISDN's basic rate will replace RS232 as the most commonly used serial interface. This argues for the existence of basic rate local-net servers to complement today's RS232 terminal servers.

Similarly, ISDN's primary rate is likely to be the standard high-speed interface for connecting PABXs, Lans and CPUs in any combination. In particular, primary rate connections between PABXs and local networks will support a far more natural flow of data communications between these domains than has thus far existed.

Provocative Scenarios

Once Lans have incorporated basic and primary rate interfaces and have achieved efficient connectivity to the telecommunications world, more provocative scenarios can be imagined.

With a common interface to PABXs and local networks, users will be able to instal a universal voice/data outlet in the wall, connect any compatible device to it and transparently use both PABX and local-net technology. This can be accomplished by forwarding traffic to the appropriate domain via a special purpose switch or at the interface to one of the two technologies.

Beyond this transparency at the wall outlet level is the potential blurring of Lan/PABX functionality. The result of incorporating ISDN compatibility into local network and PABX hardware and software, this combined functionality brings to the local-area network community the benefits of familiarity with telecommunications standards. These will enable local networks to connect directly to the carrier.

This is a strategically important position for vendor access to a customer establishment. The vendor that occupies such a position has influence on all on-premises services. This advantage will undoubtedly be contested by a number of vendors and service providers, including PTTs.

The inclusion of compressed voice traffic on local nets further blurs the distinction between PABXs and local nets to the point that it may not be possible to recognise just who is winning the battle for control of on-premises data communications.

- *Charlie Bass is co-founder and director of Ungermann-Bass Inc, a US local-area network vendor.*

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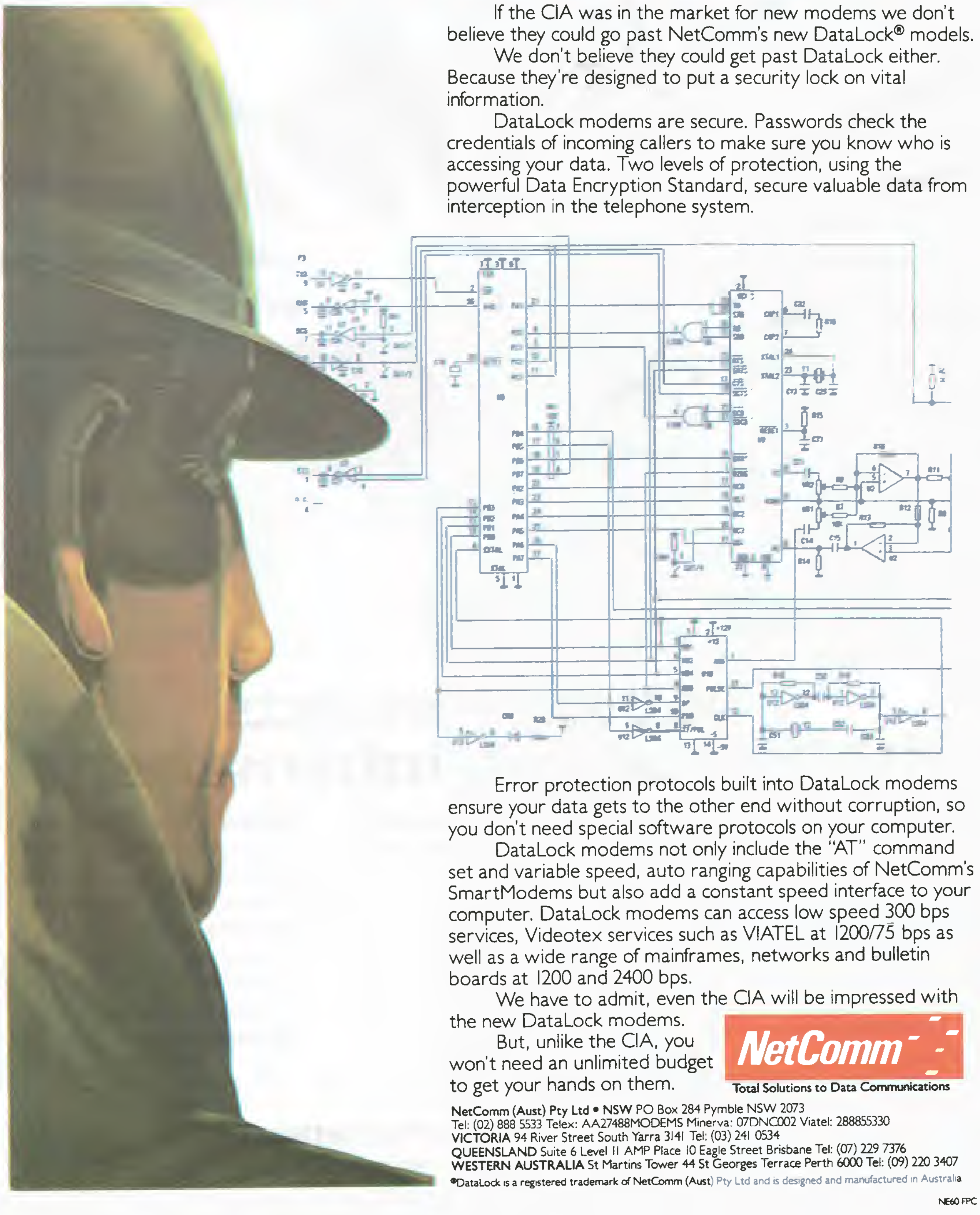

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Local and wide area networks

				Access method				Transmission medium														
Lan	Number of networks installed in Australia	Baseband (Analogue/Digital)	Broadband	Dedicated/ Non-dedicated	Token Ring	Slotted Ring	CSMA/CD	Twisted pair	Coaxial	Optical	Other	Terminals and protocols interfaced	Protocol conversion	'Gateway' interfaces	Transmission speeds (bits/sec)	Max. No. terminals per Lan	Max. No. servers per Lan	Max. Lan range (m,km)	Standard software	Cost per connection	Installation cost	Specific environments addressed
JN Almgren Pty Ltd — 16 Smith St, Chatswood, NSW 2067.																						**Tel: (02) 406 6177**
AS1050	4	✓D		✓							RS232C	Async	—	—	19.2K	100 async devices		No limit	✓	$300	$175 per unit	Local & distributed async devices
Apple Computer Australia Pty Ltd — 16 Rodborough Rd, Frenchs Forest, NSW 2086.																						**Tel: (02) 452 8000**
Appletalk Communications Architecture	3248	✓		CSMA/ CA	✓	⊏		✓ ★	✓	✓	PABX, CATV	Mac, PC, Vax, TCP/IP, Decnet	Async. serial 3270 MS-Dos, IBM DCA Wang NBI	BSC/SNA 3270/ Ethernet servers	10M (Ethertalk)	31/zone	—	300m + (dep on space)	Network/ server	$90 1799 +	Var	Most
Case Communication Systems Ltd — 10-12 Rodborough Rd, Frenchs Forest, NSW 2086.																						**Tel: (02) 451 6655**
Equinox Data PBX	45	✓ A		DATA PBX				✓ ☆		✓ ☆	RS232, Fibre-optic, RS422 current loop	Any async.	—	T1-G703-Vax	19.2K	1920	120	5km	Onboard Rom	+ $180	+ $200	Campus, large factory etc
DCX-8150	new product		✓	Either				✓				Async.	—	Open gate into OCX wide area	1.4M	72	9	100m-10,000km	—	$660	Var	Factories, offices, wide area interconnection
Computer Protocol — 33 Ryde Rd, Pymble, NSW 2073.																						**Tel: (02) 498 8588**
CP Lan	5	✓	✓		✓		✓		✓	✓		Async, VT100/200/ 240 and others	Uniscope, VIP7750 CO3 poll/select mode 4C Bisync	SNA 3270 X.25 TSO Class 4	10M	—	—	50km	—	Var	Var	—
Data Bridge Electronic Communications Pty Ltd — Suite 408, Henry Lawson Business Centre, Cary St, Drummoyne, NSW 2047.																						**Tel: (02) 819 6474**
Ungermann-Bass	—	✓	✓		✓	TB 802.4	✓	✓	✓	✓		Async, Sync. comp. PCs, most hosts	Various	SNA X.25	10M (CSMA/CD) 4M (TR)	No limit	—	No limit with bridge	Netbios TCP/IP XNS OSI	Fr $750	Var	Campus, factory etc
Datacraft Australia Pty Ltd — Maroondah Hwy, Croydon, Vic 3136 — Tel: (03) 727 9111																						
Nicom Data PABX	130 +	✓D						✓			RS232, RS422 current loop	Async, Sync	3270 SNA, BSC	X.25, TDM, Stat Mux, Unibus, Ethernet wide band mux	19.2K	2016	—		—	PoA	PoA	Computer facilities, port sharing, contention host reticulation, low cost terminal
Rose Master Switch	50 +	✓D						✓			RS232, Centronics	Async	—	—	19.2K	9 MEX of serial & parallel			—	PoA	PoA	Low cost departmental PC networking
Micom-Interlan Starlan	—	✓D					✓	✓				TCP/IP, Novell netware, Banyan Vines, Microport Unix	—	IBM PC, XT, AT Banyan, Novell	1M	—	—		Vines & netware	PoA	PoA	PC networks, PC integration, system integration
Micom-Interlan Thin Ethernet	—	✓D					✓		✓			TCP/IP, XNS, Banyan Vines, Novell netware, Async	—	IBM PC, XT, AT, RT Compaq, Banyan Novell, terminal servers. Unibus, Qbus, PC AT bus etc	10M	—	—		◀	PoA	PoA	PC networks, PC integration, system integration
Micom-Interlan Ethernet	—	✓D					✓		✓			TCP/IP, XNS, Async	—		10M	—	—		▶	PoA	PoA	Host internetworking, terminal reticulation, system integration, open systems interworking
Proteon Pronet 4	—	✓D		✓				✓				Banyan Vines, Novell netware TCP/IP	—	IBM PC, XT, AT	4M	—	—	—	Vines & netware token interface	PoA	PoA	PC networking, PC integration, comp. with IBM token ring
Proteon Pronet 10	—	✓D		✓				✓				Banyan Vines, Novell netware TCP/IP	—	IBM PC, XT, AT	10M	—	—	—	as above	PoA	PoA	As above, offers high performance & simplified IBM cabling
Banyan Network Servers	15 +			✓	✓		✓	✓	✓	✓	Supports multiple simult'ous Lans etc	Banyan Vines TCP/IP	Vines to TCP/IP	3270 SNA, 3270 BSC, X.25, leased line, dial line	dep. on Lan type	60 +, dep. on application	—	—	Vines, Netbios standard applicat'n pkg etc	PoA	PoA	Departmental & organisational, PC networking PC/host connectivity
Data General Australia Pty Ltd — 100 Dorcas St, South Melbourne, Vic 3205.																						**Tel: (03) 698 6988**
DG/Starlan	—	✓					✓	✓				ISO TP/IP, XODIAC/ X.25 Netbios	—	SNA, X.25, TCP/IP XNS	1M	150	—	2500m	WTS XTS MS Net	PoA	PoA	PC Integration & host-to-host
Thin Ethernet	—	✓					✓		✓			ISO TP/IP, XODIAC/ X.25 Netbios	—	SNA, X.25, TCP/IP XNS	10M	500	—	1000m	WTS XTS MS Net	PoA	PoA	PC Integration & host-to-host
Ethernet	—	✓					✓		✓			ISO TP/IP, XODIAC/ X.25 Netbios	—	SNA, X.25, TCP/IP XNS	10M	500	—	2500m	WTS XTS MS Net	PoA	PoA	PC Integration & host-to-host
Data Peripherals Pty Ltd — 1 Lyon Park Rd, North Ryde, NSW 2113.																						**Tel: (02) 887 2906**
Proteon Pronet-80	—	✓			✓					✓	IBM Type 1	IBM AT Multibus, Unibus, Qbus, VME bus	—	—	80M	100	64	2km	Adv N	$9093	—	Large corporations — mainframe host connection
Proteon Pronet-10	—	✓			✓					✓	IBM cabling microwave infrared	IBM AT Multibus, Unibus, Qbus, VME bus	—	—	10M	100	64	2km	Adv N	$1030	—	Fast mainframe connection
Proteon Pronet-4	—	✓			✓					✓	IBM cabling microwave infrared	IBM AT Multibus, Unibus, Qbus, VME bus	—	—	4M	100	64	2km	Adv N	$1310	—	—
Novell 68B S-Net	—	✓		✓				✓				Int/Ext bridging	—	SNA	12M	24	64	670m	Adv N 68	$470	—	Lan-Lan, -host, -PC
Novell Advanced Netware 86 & 286/E	—	✓					✓		✓			Int/Ext bridging	—	SNA	10M	100	64	185m	Adv N 86/ 286	$735	—	
Novell Advanced Netware 86 & 286/RX	—	✓		✓	✓ TP			✓	✓			Int/Ext bridging	—	SNA	2.5M	128	64	6100m	Adv N 86/ 286	$655	—	
AST Starlan	—	✓				†		✓				Int/Ext bridging	—	—	1M	64	64	2600m	AST Adv N	$585	—	Entry level Lan
Dataplex Pty Ltd — 709 John St, Lilydale, Vic 3140.																						**Tel: (03) 735 3333**
Com Design LS2000	—	✓	✓	Either			✓		✓		A	Async		—	10M	32,768	1024	1500m	Operating system	$400-$500	—	Campus area, High rise
Easy Street			✓	✓ ND							Flat cable or ribbon cable	Any terminal with ports, V24 or RS232	—	X.25, IBM SNA, Ethernet	19.2M	No limit	48	15m	Easy Street	$2197	—	Wide ranges of equipment
Data Point Corporation Pty Ltd — 157 Walker St, North Sydney, NSW 2060.																						**Tel: (02) 922 3100**
ARC and ARCNET	130	✓			✓			✓	✓	✓	IBM Type 1 3/6 shielded pair	IBM PC/XT/AT & comp, Datapoint terminal	Wang, Tandem, TTY, MS-Dos, Telex, Unisys, Honeywell, DEC	SNA/BSC X.25	2.5M	255	—	610m	Datapoint RMS	$1355 (PC)	Var	Office automation, PC Lans, Commercial data processing
Digital Equipment Corporation (Australia) Pty Ltd — Chatswood Plaza, Railway St, Chatswood, NSW 2067.																						**Tel: (02) 412 5252**
Ethernet	1000 +	✓ D					✓	✓	✓	✓	Microwave	IEEE 802.3	—	SNA X.25	10M	No limit	No limit	8km	—	—	—	—
Hewlett-Packard Australia Ltd — 31 Joseph St, Blackburn, Vic 3130.																						**Tel: (03) 895 2895**
HP Thinlan	—	✓ D					✓		✓			IEEE 802.3	—	HP AdvanceNet	10M	30 nodes/ segment	—	185m/ segment	MS-Net	$1816/user $3288/server‡	#	Lan-host, PC-PC
HP Starlan	—	✓ D					✓	✓				IEEE 802.3	—	HP AdvanceNet	10M	500	—	250m between nodes	MS-Net	$1170/user $2723/server	#	Lan-host, PC-PC
ICL Australia Pty Ltd — 14 Rodborough Rd, Frenchs Forest, NSW 2086.																						**Tel: (02) 452 9900**
Oslan	90	✓ D					✓		✓		Fibre optic	Mainframes, Department terminals	X.25, Async IBM	X.25, Async IBM	10M	1024	—	2500m +	ISO 8802/3 & ISO Transport OSnet Lan mgt	$700	PoA	Terminal-mainframe, Mainframe-terminal, departmental & office systems
Imagineering — 77 Dunning Ave, Rosebery, NSW 2018.																						**Tel: (02) 697 8666**
3 Com	1600	✓			✓		✓	✓	✓	✓	Broadband Ethernet		Via bridge	Async, SNA 3270 X.25 XNS, 5250 etc	4M-10M	No limit	No limit	2.8km (coax)	3 Plus	$800	—	—

Key: ✓ = column heading applies; — = column heading does not apply/information not supplied; Var = price dependent on configuration; A = Analogue; D = Digital; CSMA/CD-CA = Carrier Sense, Multiple Access with Collision Detection - Collision Avoidance; ★ = shielded/unshielded; ☆ = Dist server; ▮ = mid/high split; ⊏ = Ethernet 802.3; ' = Token Bus 802.4;
† = Daisy chain & star; ‡ = ex tax; § = Arcnet; # = custom installation; bsb = baseband; brb = broadband; TR = token ring; TB = token bus; TR = token passing; Adv = Advanced; N = Netware; LT = Linear topology; NR = New release; Et = Ethernet; ◀ = Vines, netware, RAF Decnet Dos, NFS & PC link; ▶ = VMS/TCP UVMS/TCP Zodiac, RAF, NSS etc.
The Product Spotlight on Local Area Networks is based on information obtained from a survey of Lan vendors conducted between August 20 and September 22, 1987. All details should be checked with the respective companies as listed.

Local and wide area networks

Lan	Number of networks installed in Australia	Baseband (Analogue/Digital)	Broadband	Access method				Transmission medium				Terminals and protocols interfaced	Protocol conversion	'Gateway' interfaces	Transmission speeds (bits/sec)	Max. No. terminals per Lan	Max. No. servers per Lan	Max. Lan range (m,km)	Standard software	Cost per connection	Installation cost	Specific environments addressed
				Dedicated/ Non-dedicated	Token Ring	Slotted Ring	CSMA/CD	Twisted pair	Coaxial	Optical	Other											
Micro Networks Pty Ltd — Level 1, 1 Gurrigal St, Mosman, NSW 2088.																						**Tel: (02) 969 6922**
G/Net	1050	✓D	—	Both	—	—	CSMA/CD/ CA, PA EDC		✓			PC, PS/2 30		Async X.25, SNA 5251 Fax Telex	1.43M	255	64	6.4km	Novell Netware	$780	—	Sites requiring total connectivity
G/Ethernet	100	✓D		Both	—	—	CSMA/CD/ TCP/IP		✓	✓		PC, PS/2 30		Async X.25, SNA 5251 Fax Telex	10M	255	64	1372m	Novell Netware	$767	—	Sites requiring total connectivity
G/Token Ring	—	✓D	—	Both	✓	✓	IEEE 802.2 LLC IEEE 802.5	✓				PC, PS/2 30		Async X.25, SNA 5251 Fax Telex	4M	255	64	N/A	Novell Netware, IBM PC Lan	$1000	—	IBM houses
Univation Ethernet	6	✓D	—	Both	—	—	CSMA/CD TCP/IP		✓			PC, PS/2 30	SMTP FTP	Async X.25, SNA, 5251, Fax, Telex	10M	255	64	609.6m	Novell Netware & Lifenet	$875	—	DEC connection
Yamatech Arc-Net	—	✓D	—	Both	✓	✓	Modified Token Passing		✓	✓		PC, PS/2 30		Async. X.25, SNA, 5251, Fax, Telex	2.5M	255	64	N/A	Novell Netware	$649	—	Sites requiring total connectivity
NCR Australia Pty Ltd — 8/20 Napier St, North Sydney, NSW 2060.																						**Tel: (02) 964 8111**
Towernet	8	✓			✓		✓		✓	Opt		XNS Tower	—	SNA X.25	10M	100	—	500m	Towernet PC Connect PC Server	PoA	PoA	
NEC Information Systems Pty Ltd — 99 Nicholson St, St Leonards, NSW 2065																						**Tel: (02) 436 8333**
Novell Networking	200	✓		Either			✓	✓	✓			Var	TCP/IP, SNA, IPX & various	Var	1-10M	100/file server	8/work-station	330m +	Any	$2890-$3750	PoA	Database, word processing

Designing for the future

By Kevin Slatter

THE justification of any local or wide-area network (Lan or Wan) must be in the current and future users' applications carried by the networks. Herein lies the problem for the network designers: today's applications are readily definable, but tomorrow's needs are yet to be thought out.

We know they include X.400 for electronic mail, Ftam for multivendor file-transfer, access and management, Videotex for public access databases plus many other industry standards and applications which are user-specific.

A demonstration is planned for this month by the OSIcom organisation to prove functional interworking, between different vendors equipment, of both X.400 and Ftam. This demonstration is not only to prove commitment by the vendors and common carriers, but to give the network designer a view of the future.

How then do we build today's networks to be moulded into tomorrow's networks, rather than be replaced? The answer lies in the careful selection of the technologies that underpin the network. These technologies will be selected from a vast range of offerings in the marketplace, but how do we know which ones are going to hold us in good stead over the coming years?

The answer must lie with accepted standards which have proven vendor and user support. For example, X.25 as a wide-area networking mechanism is well documented by the different standards bodies, and is implemented and supported by most domestic and international carriers such as Telecom (Austpac), OTC (Midas), British Telecom (PSS), the German PTT (Datex P), and the US Bell companies. Many telecommunications vendors can supply switches for private X.25 networks, and many major computer vendors sell equipment which operates natively over X.25 links.

Future application developments, such as X.400 and Ftam, are being designed to run over X.25. A decision to go X.25, with its current standards, user, and vendor support, and with its future application support, will give a network which can be moulded to meet future needs.

For example, Alexander Stenhouse, a major Australian insurance broking group, initially installed a large HDLC-based Wang network. This network has evolved into a

(Continued page 25)

Datacraft's 2nd generation PC network system from Banyan.

Here's the network you never thought was possible: the mythical 'super glue' that connects so transparently, you could access a file in a New York mainframe as easily as if it were on your PC's hard disk. Or will just as happily link with your Token Ring net in Sydney and your Ethernet in Melbourne.

This is PC networking's second generation. Around the world it raised a buzz of excitement which has grown to a clamour of applause. Already it has won over major users like Merrill Lynch and the World Bank.

Banyan's features.

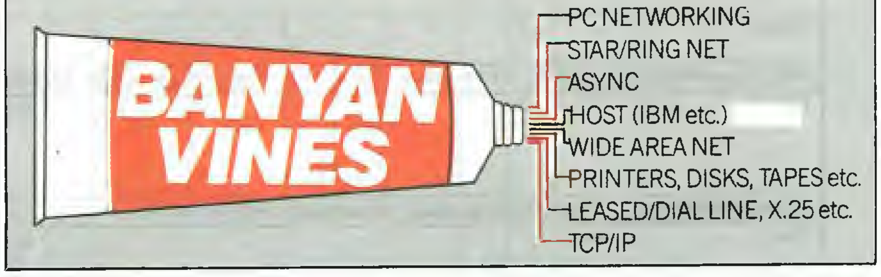
Banyan is remarkable. It is the only system which combines a flexible local area net with

☐ *true* LAN to LAN connectivity,
☐ simultaneous support for multiple LANs,
☐ full PC/HOST connectivity,
☐ shared applications and peripherals,
☐ central network controls and diagnostics.

All flowing simply, seamlessly, through one consistent user interface.

☐ Enhanced electronic mail,

Banyan's Vines software allows transparent interconnection.



Local and wide area networks

Lan	Number of networks installed in Australia	Baseband (Analogue/Digital)	Broadband	Access method: Dedicated/ Non-dedicated	Access method: Token Ring	Access method: Slotted Ring	Access method: CSMA/CD	Transmission medium: Twisted pair	Transmission medium: Coaxial	Transmission medium: Optical	Transmission medium: Other	Terminals and protocols interfaced	Protocol conversion	'Gateway' interfaces	Transmission speeds (bits/sec)	Max. No. terminals per Lan	Max. No. servers per Lan	Max. Lan range (m,km)	Standard software	Cost per connection	Installation cost	Specific environments addressed
Network Solutions Australia Pty Ltd — PO Box 1173, 77 Pacific Hwy, North Sydney, NSW 2060.																						**Tel: (02) 957 2655**
Sytek-LocalNet	30+	✓	✓ A				✓		✓			Async, LocalNet	Ascii IBM 3270	—	19.2K (pcu) 38.4K (ptu)	32/server	32,768	30km radius	LocalNet	PoA	PoA	Spasmodic terminal traffic
Sytek-PC Network	30+						✓		✓			Sytec LocalNet	—	Sytek 2000 SNA	2M	1000	—	5km radius	Netbios	PoA	PoA	
3 Com PC Network	500+	✓					✓		✓			IBM PC XT AT, PS/2 (30) Apple Mac	—	3270 Async. TR	10M	—	—	1000m/ segment	Ether Series 3+	PoA	PoA	
Bridge ESPL Products	50+	✓	✓		✓		✓		✓	✓		XNS TCP/IP OSI	SNA X.25	X.25, TR, bb, Multiple Ethernets	10M (bsb) 5M (brb) 4M (TR)	64/server	1024	2.5km (bsb) 15km radius (brb)	XNS TCP/IP Network Mgt	PoA	PoA	
Nixdorf Computer Pty Ltd — 655 Pacific Hwy, St Leonards, NSW 2065.																						**Tel: (02) 439 5477**
Nixdorf Ethernet	—	✓ D					✓		✓			Nixdorf, IBM, DEC, Unix	3270 Ascii	TCP/IP IEEE 802.3	10M	Host dependent	—	2.5km	KNET (VM/ 370 req)	$8000/host	Var	Multi-host environments
Nixdorf Broadband Network (NBN)	—		✓ ■	✓			✓		✓			SDLC, HDLC, Bi-sync, Async, IHSS	All standard	IEEE 802.X	1.2K-2M	Dependent on protocol req		2.5km	—	$1000-3000	Var	Multi-host/terminal environments
Optical Networks Pty Ltd — 1/54 Malvern St, Bayswater, Vic 3153.																						**Tel: (03) 720 4766**
Optical Networks		✓			✓	✓	✓			✓	—	Misc	—	✓	Misc			180km		PoA	PoA	Large Lans, or hostile environments

(Continued page 29)

Tomorrow's needs

(Continued from page 24)

private X.25 net, using the same DDS lines and computer hardware, with only software changes required. Reed Stenhouse is now positioned to take advantage of technologies such as X.400, without any major network or computer replacement.

Another well accepted wide-area networking technology is SNA, which has a large installed user base, commitment from many vendors, and a future in applications development due to the evolution of such tools as LU6.2, PU2.1 and Snads.

On the local-area network scene, the most widely accepted and implemented technologies are those which evolved from the original Ethernet implementations. Today, the IEEE 802.3 standards have not only received support from most international and domestic standards organisations but also from vendors and users alike.

The 802.3 can be implemented on baseband coax, twisted pair, broadband cable such as Wangnet, and now even on fibre optic. As 802.3 conforms to the ISO seven-layer architecture for the lower layers, it can be used for applications such as X.400 and Ftam in local environments instead of X.25.

Token Ring (802.5) has not yet received the implementation support of the Ethernet-derived technologies, but could be the other viable alternative to 802.3.

What then of the newer technologies, specifically ISDN which has received so much publicity? As with all new well-supported technologies, implementations will emerge. Who will use it, and for what? These questions will be answered as products emerge, and as we see the results of field trials conducted by such organisations as Telecom.

This is of little use to the network implementator of today. However, market forces will dictate that ISDN will have a slow implementation unless it proves compatible with the majority of installed networks.

We can then be confident that ISDN will cater for the transport of X.25 and SNA networks and that bridges from the 802.3 world to the ISDN world will be made available. We cannot predict, with the same confidence, that technologies that do not have wide vendor and user support will be able to be merged with tomorrow's offerings.

● *Kevin Slatter is manager, networking and voice products, with Wang Australia.*

re's the networking
been waiting for.

☐ store and forward,
☐ certified mail,
☐ file attachment.
☐ Mainframe-type security and encryption,
☐ hierarchical administration and usage,
☐ approved audit trail,
☐ global access system, *'Street Talk'* – so one name will find the file wherever it is in the world.

You see, from the beginning Banyan was created to handle networks for those who think *big*.

VINES.

The key to the system is VINES, Banyan's advanced networking software. VINES can accommodate any sized network, incorporating thousands of users. Connecting *all* your computer resources from PCs to mainframes, from Coolaroo to Timbuktoo. In a word, it's the *super glue* everyone's been waiting for.

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The leading data communications company is Australian.

DEC targets voice-switching

By Bob Wallace

DIGITAL Equipment Corp's voice networking strategy, to work with multiple private branch exchange vendors to create integrated voice and data applications, may prove to be wiser, less time-greedy and more economical than buying a PABX maker, assimilating the company and bringing its switches into DEC's data networking framework.

DEC delineated its voice/data integrating strategy at Telecom '87 conference in Geneva with the announcement of its Computer-Integrated Telephony (Cit) program.

The program was designed to encourage development of applications that combine the power of computers and telephone switches. These applications could, for example, enable an attendant receiving an incoming call to transfer the call simultaneously with a screen full of data extracted from a computer database to a customer service representative.

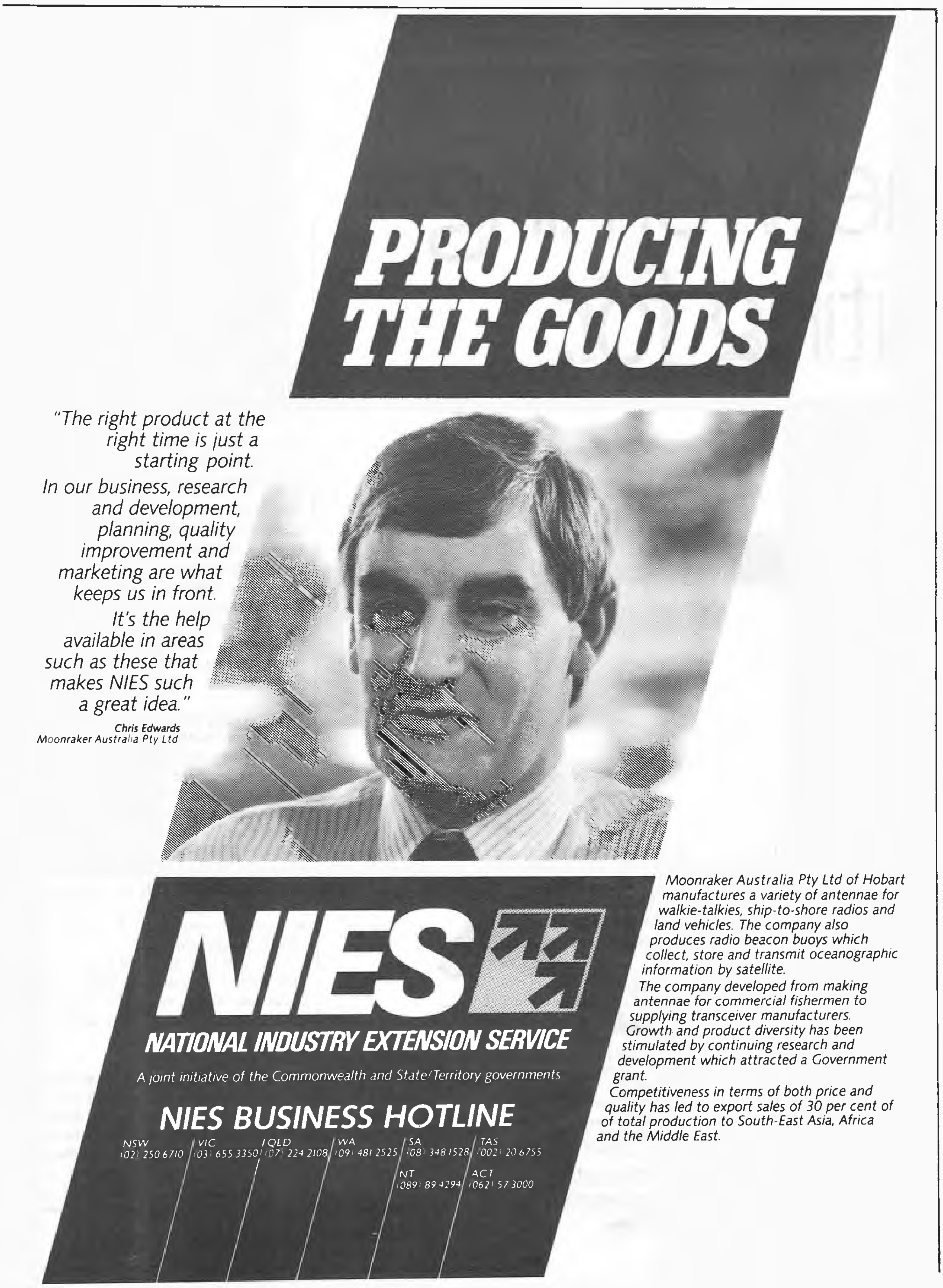
Under Cit, both DEC and various PABX vendors such as Siemens are developing software that allows the two devices to communicate via a synchronous interface. DEC develops software that will reside in the computer, and the switch vendor writes interface software for the PABX. A DEC spokesman said DEC computers will require different software modules, depending on which is used.

The Cit program will enable DEC to bid with any Cit members to offer users one point of contact for voice switching and data networking gear. "Before Cit," a DEC source said, "DEC was not involved with user bids that requested voice. We intend to work with PABX providers to address these bids."

DEC sees voice switching as an entirely new frontier but said it will not create a separate sales and marketing contingent to sell integrated voice and data applications. Other vendors — such as IBM, with its Enterprise Marketing Program — support a SWAT team approach for large voice/data requests for proposal.

How successful DEC is with its Cit program depends largely on how many switch makers join the effort and to what extent they participate in the program.

DEC said NEC, Ericsson, Philips, Plessey and Siemens would work with DEC to develop the software and hardware needed to facilitate the use of integrated voice/data applications.



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Chris Edwards
Moonraker Australia Pty Ltd

Moonraker Australia Pty Ltd of Hobart manufactures a variety of antennae for walkie-talkies, ship-to-shore radios and land vehicles. The company also produces radio beacon buoys which collect, store and transmit oceanographic information by satellite.

The company developed from making antennae for commercial fishermen to supplying transceiver manufacturers. Growth and product diversity has been stimulated by continuing research and development which attracted a Government grant.

Competitiveness in terms of both price and quality has led to export sales of 30 per cent of total production to South-East Asia, Africa and the Middle East.

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				NT	ACT
				(089) 89 4294	(062) 57 3000

Industry outlook

WANDELL and Golterman of West Germany has won a contract with the Indian telecommunication department to supply four network monitor and surveillance systems. The systems, to be installed at New Delhi, Bombay, Calcutta and Madras, will monitor the performance of the analogue trunk networks to improve maintenance and performance.

INSTALLATION of Infotron Systems' intelligent network exchanges in Sydney has helped Prime Computer reduce the cost of running its own internal information systems. The exchanges link the company's North Ryde and North Sydney facilities by a 2 M-bit/sec tie line. Bulletin redundancy protects against failures.

WANG Computer's factory in Canberra is stepping up production of its 4230A monochrome workstation to meet increasing world-wide demand. More than 200 units are being manufactured each week as Canberra vies with Taiwan for an increasing share of this market.

DATAPLEX has won Telecom's first "triple A" Award for its high standard of manufacture and supply of data transmission equipment. The company won the first award for DTE-type equipment, and the second and third for DCE equipment for direct connection to Telecom lines. The awards will be presented on completion of the company's move to is new head office at Lilydale, Victoria, this month.

THE CANADIAN communications department has approved the Philip's cellular car phone, which paves the way for marketing of the Australian product. Orders have already come in from New Zealand for the FM 9010 cellular radio, launched last October. The product will compete with Japanese and Taiwanese rivals in the North American market.

GANDALF Pacific, a subsidiary of Gandalf technologies, has begun selling direct to enduser customers. The company says this will help organisations develop their own systems solutions to business communications problems.

VOCA Communications claims to be the first major telecommunications supplier to open a retail outlet for sales, direct to the public. The outlet, in Prahran Victoria, stocks the full range of Voca telephones, cellular mobile phones, facsimile machines, answering machines and pagers.

OLIVETTI Australia and Logica have agreed to jointly support and manage Australian installations of a US on-line banking system. The ON/2 system has been installed at five major financial institutions.

DISTRIBUTED Data Processing (DDP) of Melbourne has opened a Sydney office to handle sales and marketing in NSW. However, the DDP Melbourne technical team will continue to handle service and support.

A PAGING system designed by Voicecall will be sold throughout Europe following a technology-transfer agreement between Voicecall and the Dutch company Ericsson Paging BV. The Australian paging company said that it is the first time this type of technology has been exported. Sales are expected to start in mid-year.

CO-CAM Computer will market Finnish microcomputer-based teletex programs in Australia and the Far East, under an agreement with the software house Kaakontieto of Helsinki. The Teletex 3000, said to allow document transfer to a variety of receivers, is capable of running on a base of 700 minicomputer systems in Australia.

4-channel muxing modem

THE new Mux 25SM multiplexing modem from Scitec Communication Systems is a 2.4K-bit/sec modem combined with an integral four-port statistical multiplexer. The unit operates in pairs to provide 4-channel data communications to printers and terminals over a single leased line or dial-up two-wire links.
Scitec Communications Systems, (02) 428 9555.

S/3X-compatible workstations

FOUR new IBM System/3X compatible Decision Data products have been released by STC. New Model 3497 color and Model 3496 monochrome workstations are cartridge-driven and feature a system-addressable parallel printer port suitable for low-cost PC graphics printers.

Also available is Decision Data's Model 6704 matrix line printer, with data and graphics capabilities. Performance is 400 lines per minute in draft mode, 300 in DP mode, and 175 in near letter quality mode.
STC: (02) 925 7272

Pack enhances mux capability

DATACRAFT has released the MB3-ESW Enhanced Synchronous Wideband Multiplexer Featurepack for Micom Box Type 3 (MB3) range of multiplexers. The featurepack enables the MB3 to operate as a wideband sync/async, statistical multiplexer with composite data rates from 38.4K-bits/sec to 72K-bits/sec. Up to 16 async or 8 sync channels are supported.
Datacraft Australia: (03) 727 9111

Device expands connectivity

NEW functions and products designed to expand the connectivity of Courier's 3270-compatible controllers are available from STC.

New to the Courier Information System 9000 product line is a device adapter that allows attachment of up to eight IBM-compatible displays and printers to the controllers. Dual host capability was also announced, offering simultaneous communication with two SNA CPUs from one controller.
STC: (02) 925 7272

8-line version of Ultranode

NETWORK Automation has announced an 8-line version of the Ultranode network node for use with its Australian designed Optinet range of packet-switching systems. The Ultranode-8 supports eight serial lines, of which the first is the interface to the Optinet network while the remaining seven are used for terminal interface ports. It supports network connection at up to 9.6K-bits/sec and provides network management functions such as power supply monitor and network line status check.
Network Automation: (02) 929 4988.

Model ensures high reliability

DATA Bridge has introduced a new 9.6K-bit/sec V.32 modem family. Its features, which include trellis coding, echo cancellation, adaptive equalisation and automatic/manual fallback to 4800 bit/sec, should ensure high reliability on a wide range of unconditioned telephone lines. After-tax prices range from $A3651 to $A4999.
Data Bridge: (03) 578 0814

Lannet reduces cabling cost

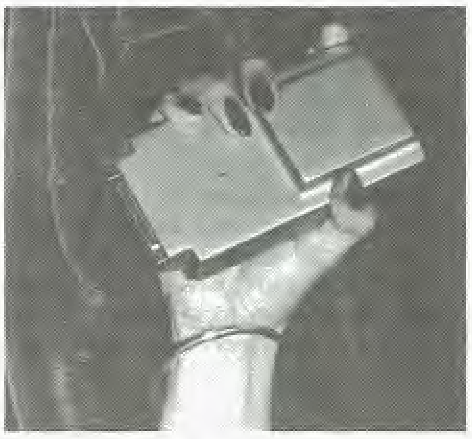
THE Lannet LM-290 family of IBM 3299-compatible terminal and controller multiplexers is now available from Datacraft. They are designed to reduce the cost of cabling to remote IBM 3270 Cat a terminal locations by multiplexing up to 32 terminals on to a single composite line. Terminal multiplexers are connected either to a corresponding controller, or directly to a port of the IBM 3274 with integral eight-channel multiplex facilities.
Datacraft Australia: (03) 727 911

Sendata claims world firsts

MELBOURNE — Sendata has come a long way from acoustic couplers with the new miniature version of its multi-speed error-correcting security modem, which it will display to European distributors and OEMs at Cebit in Hanover next month.

The $A790 Macro Modem can claim several world firsts for a palm-size unit, according to managing director Jim Grossett: it is believed to be the first in this category to offer four data rates (300-2400); the first to include encryption (a $A100 option), the first with automatic error correction (to level six of the Microcom Networking Protocol MNP) and the first to offer full operating menus at the terminal.

Grossett said there was "lots of demand for security" at 2400 bit/sec. The company had therefore decided to include DEA-standard encryption on the pocket modem as well as on the standalone version, the Quad Security Modem (QSM).



The Macro Modem . . . on show at Cebit

"Porting" the design of the QSM to the Macro Modem version was not a trivial undertaking: chip count and power consumption had to be shrunk drastically without giving up functionality. The design team ended up "losing" only the front panel LCD display and a chunk of the QSM's almost 2K-bytes of non-volatile memory (an Eeprom now accommodates 512 bytes for phone directory, dial-back functions and configuration). But there is enough Ram left to buffer DTE common port speeds up to 9.6K-bit/sec.

The transition was helped by having a software USART (the CPU clock speed was boosted to cope with the extra 26 per cent of processing load,) and by changing to smaller and cooler modem chips from US maker SSI. The final chip count is now 14, and their current draw easily accommodated by a self-recharging nicad battery.

Other characteristics of the Macro Modem — featured at the Australian stand at Cebit — include adaptive dialling, auto-ranging, full Hayes 2400 compatibility, full call progress detection, two programmable configurations, six programmable phone numbers and site names, and four programmable dial-back users with three levels of password protection.

Quicker full duplex modem

THE Semetrans 9696, developed by Philips' French subsidiary TRT, is said to work four times faster than previous generations of equipment. Transmission tests between three continents are said to have proved the operating simplicity and reliability of this new 9.6K-bit/sec full duplex V.32 modem released recently by Philips.
Philips Australia, (02) 925 3333

Battery-powered pocket unit

ADVANCED Components has released the AM-312OP pocket-sized modem. It supports Bell 103 /212A, CCITT V21/V22 protocols and the extended "AT" modem command set. The unit can be powered by an ordinary nine-volt battery. Recommended retail price is $A625 to $A675.
Advanced Components Pty Ltd: (03) 739 119

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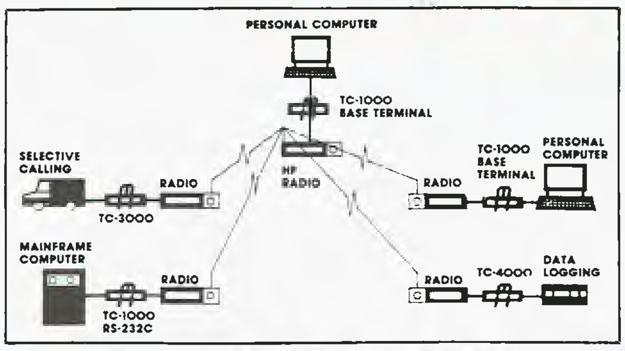
OVER RADIO



Features include:
★ Compatibility with HF-SSB. VHF and UHF radio.
★ Transmission of the ASCII character set.
★ Totally private.
★ Completely accurate.
★ Copes with frequency offsets of 360HZ between data frames.
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Fax v PC cards

SYDNEY — Fax-makers are fighting back to stem the tide of PC addon cards eating into their hard-won territory, and hardly a week goes by without a new PC link announcement by the established makers of standalone facsimile machines.

Xerox recently released software that allows a personal computer to act as a hub in a facsimile network. Faxmaster 21, a $A995 program that controls a suitably updated (more memory and a serial port) Xerox 7020 from an MS-Dos machine (Dos 3.1 required), provides conversion between Ascii and fax formats and lets users make the fax double as a scanner for their PC. They can access and edit fax image documents using PC programs such as PC Paintbrush Plus or Dr Halo II. In addition, the 7020 can be used as a PC printer or plain paper copier.

Wordprocessing documents can be sent out straight from the PC via the fax, or incoming faxes stored to the PC's hard disk, as is also done automatically when the fax runs out of paper. (Note that an average-sized fax document usually chews up 24K-bytes of disk space.)

Document distribution lists can be held on the PC and sent to individual facsimile recipients and polling can be commanded from the PC. Faxmaster 21 can be set up to make the PC the hub in a fax mail network, letting remote users dial into the system using a security code to retrieve any documents stored for them. Up to 60 documents can be held in the fax machine's 1M-byte of memory. Remote users can enter commands from a push-button telephone or from the 7020's keypad.

A similar package for the Ricoh 210 is being tested by Delairco Business Equipment, the local Ricoh distributor. The upgrade, for which no local pricing was announced, consists of Imagenet and Imagemail software and an RS232C board for the 210 fax. Imagemail (US price complete with Imagenet for fax format conversion is $US395) reportedly enables the PC to transmit documents to up to 250 remote fax or PC recipients on a distribution list.

In the US, Ricoh has also released its own fax card for PCs, called the Image Card, said to be capable of background operation, with alerts flashed on to the PC screen when fax messages are being received. The card with software costs $US1175.

Users of the Canon 710 and 730 fax machines are targeted by US software house Bright Ideas with the $US795 Faxmate program, which makes these machines perform tricks similar to those from Xerox and Ricoh when fitted with a serial port.

New e-mail gateway

BETTER Dynamic Computing of Sydney has developed a software gateway product, VSKlink, which allows the Wang Office e-mail systems to send and receive mail to any other computer or e-mail system interfaced with the Telecom/OTC Keylink system.

With the new gateway, two-way low-volume telex is available to Wang users. Inter-organisation communications will be more efficient, as Keylink-T is the common transport and network forward component. The picture shows an e-mail screen on a Wang Office terminal. *Better Dynamic Computing: (02) 692 9264.*

370 connectivity for DEC users

SYDNEY — Some 85 per cent of the world's data are on IBM and PCM mainframes — and DEC users want access to it, argued National Advanced Systems (NAS) when it announced three S/370-DEC connectivity products here recently.

The company announced NAS*Net, a frontend communications module providing the physical link between a NAS mainframe and a Decnet network via Ethernet; NAS*Link control software and NAS*Compute, a Fortran 77 application porting package for developing Vax/VMS software on NAS CPUs.

The releases, due in the second and third quarters, are primarily aimed at the engineering/scientific user, but company spokesmen noted that Australia is "atypical in DEC installations", having more commercial than scientific user sites.

NAS*Net links AS/VL or AS/XL series CPUs to Decnet, making the mainframe look to the network like a Decnet node. Its coax channel interface, NS3200 processor and Ethernet controller provide 28 logical Ethernet links.

NAS*Link mainframe-resident software transparently connects DEC Vax/VMS and NAS/VMS or VM environments, letting users access data on the Vax with familiar TSO/CMS commands or on the NAS with DCL (Digital Command Language) requests.

Data translation, access to record level but no file transfers, inter-task communications like IBM's AAPC, e-mail such as Profs and Decmail, terminal emulation, RJE, batch submission and so on are available. A significant user gain was possible because NAS*Net and NAS*Link "not only connect but share files", according to a spokesman.

The announcements form part of a new thrust for NAS into connectivity alliances and partnerships, including one with Sun Microsystems aimed at penetrating the Unix market. The new products were "of strategic importance for NAS and the basis of future products", said a spokesman, who added that X.25, TCP/IP and X.400 links were "coming".

IBM mainframes get fax capability

RESTON, Virginia — Facsimiles can be sent from IBM hosts by VM Fax, a $US30,000 program developed by US-based software house Systems and Telecoms here. VM Fax essentially lets users type a message into an existing terminal, and send the message to any facsimile user worldwide.

According to Systems & Telecoms President Paul Grigg, "VM Fax was designed for businesses with IBM mainframe or mid-range computers that need to sent faxes." The product keeps a detailed log of all faxes sent, including the time sent and the recipient.

It also offers automatic dial, automatic retry, priority transmission, transmission at a specified time or date, nicknames in place of numbers and single send to multiple destinations. VM Fax is integrated with IBM Profs, and can therefore provide a gateway between large and small IBM systems, according to the company. Systems & Telecoms develops communications software for the VM/CMS and Unix operating systems and has a European subsidiary in Reading, England.

Olivetti connects with Filenet

OLIVETTI Australia has announced a series of Filenet software products which allow Olivetti PCs and compatibles to connect to the Filenet image handling system. Users can store PC-generated data and text with document images on the Filenet system. Both batch and online communications are supported. A central Filenet system can collect documents from remote sites and move them to requested systems at nominated times.

Olivetti: (02) 358 2655

Extended network support from DEC

DIGITAL Equipment Corporation has extended its Network Applications Support program to provide a universal access to services on the open Decnet/OSI network. The enhanced Network Applicatons Support allows customers to communicate and share information between Vax/VMS, Unix, Apple Macintosh, MS-Dos, OS/2 and the Vax VT family terminals.

Decnet/OSI network services include All-In-One/Decwindows, Enterprise Info Services, document services, and database access. DEC recently announced a new Decnet licensing policy under which any Vax running Decnet is automatically licensed as a PC server.

Digital Equipment Corp (Aust): (02) 412 5252.

Virtual machine capability offered

WANG Australia has introduced VS/VM, a software product that allows multiple operating systems to run concurrently as "virtual machines" on a single Wang VS computer.

VS/VM supports a combination of up to 15 VS and VS IN/ix (an AT&T Unix System V.2 operating system for Wang VS computers). These guest operating systems share main memory, central processing power and I/O devices.

By enabling migration of software programs VS/VM creates an environment in which multiple VS and Unix programs can be developed and applied concurrently. System administrators can ensure security by prohibiting virtual machines from accessing memory allocated to other virtual machines.

VS/VM is targeted for use on all high-end VS 7000 Series processors and earlier VS 85 and VS 100 models. Licence fees will range from $A14,000 to $A28,000, depending on the size of the VS system.

Wang: (02) 925 5094

Networking for series 20 users

DATACRAFT Australia has released interconnect software for the Micom Instanet 6000 Series 20 Data PABXs. This interconnect software will allow various networking configurations including chain, star, and ring topologies to link data PABX's in serial or chain configurations. The software for the Series 20 is identical to that available in the Series 40 and the Instanet 6600 Data PABX. It is compatible with the earlier Micro 600 interconnect software.

Datacraft: (03) 727 911

Local and wide area networks

Lan	Number of networks installed in Australia	Baseband (Analogue/Digital)	Broadband	Access method				Transmission medium				Terminals and protocols interfaced	Protocol conversion	'Gateway' interfaces	Transmission speeds (bits/sec)	Max. No. terminals per Lan	Max. No. servers per Lan	Max. Lan range (m,km)	Standard software	Cost per connection	Installation cost	Specific environments addressed
				Dedicated/ Non-dedicated	Token Ring	Slotted Ring	CSMA/CD	Twisted pair	Coaxial	Optical	Other											
Porchester Computers Pty Ltd — 177 Barkly St, St Kilda, Vic 3122.																						**Tel: (03) 537 2722**
Orchid Technology PC Net + Advanced Netware (Novell)	4000+	✓					✓		✓			IBM PC XT AT & compatibles	—	Netware gateway compatible	1M	50	—	700m	Adv N 86/286	$950	Var	All Lan environments
Prima International — Unit 6, 49-51 Salisbury Rd, Asquith, NSW 2078.																						**Tel: (02) 476 5760**
Tigan	New prod.	✓D					✓	Opt	Opt	Opt				SNA 3270 X.25 XNS	10M	No limit	No limit	5000m	Tigannet Novell	$900 av	PoA	
Bread Board		✓D		✓D				✓		✓		RS232		any	19,200m	64	64	2km	Dcs	$400	Var	PC Bulletin Board
Prime Computer of Australia Ltd — Philips Bldg, 1st Floor, 15 Blue St, North Sydney, NSW 2060.																						**Tel: (02) 929 0044**
Ringnet	150	✓D			✓				✓	✓		X.25	—	SNA TCP/IP	10MHz	255 nodes		5km	PrimeNet	PoA	PoA	Prime host environments
Lan 300	New release	✓					✓		✓	✓		Async. X.25 TCP/IP	IEEE 802.2	SNA	10MHz	1024 terminals/users		2.5km/node IEEE 802.3	PrimeNet NTS WS1300	$400/ terminal	—	Terminal/host PC based networks
Scitec Communications Systems Ltd — 3 Apollo Place, Lane Cove, NSW 2066.																						**Tel: (02) 428 9555**
MDX-5000	50	✓D						✓			RS232, RS422, VLI, V35	Any Async, any sync (Protocol transparent)	Async to X.25	X.25	256K	No limit		No limit	Range of personality modules	Var	PoA	Local & wide area network
Shuttle Datacomm Pty Ltd — 456 St Kilda Rd, Melbourne, Vic 3004.																						**Tel: (03) 267 1011**
Vianet Ethernet	250	✓		✓ND			✓		✓	✓		IBM PC/XT/AT, PS/2		Async	10M	255	—	300m	Vianet, any PC package	$800	PoA	Peer to peer, distributed network
Vianet Starlan	250	✓		✓ND			✓	✓				IBM PC/XT/AT		Async	1M	255	—	5000m	Vianet, any PC package	$700	PoA	Peer to peer, distributed network
Novell Ethernet	500+	✓		Either			✓		✓	✓		IBM PC/XT/AT, PS/2		Async, TCP/IP, 3270, 5250	10M	100	84	300m	Any PC-Dos	$650	PoA	High performance, high thru-put Lan
Novell Starlan	200+	✓		Either			✓	✓				IBM PC/XT/AT,		Async, TCP/IP, 3270, 5250	1M	100	84	5000m	Any PC-Dos	$650	PoA	High performance, high thru-put Lan
Novell Arcnet	300+	✓		Either	✓				✓			IBM PC/XT/AT, PS/2		Async, TCP/IP, 3270, 5250	2.5M	100	84	6000m	Any PC-Dos	$650	PoA	High performance, high thru-put Lan
Commtex CX-80	New product			✓D				✓	✓		RS232, RS422, current loop	Async, sync, Type A coax	3270-ascii, 3270-X.25		Var	No limit	No limit	No limit		$500+		Multiple post
SPS Software Product Support Pty Pty Ltd — Suite 21, Chatswood Village, 47 Neridah St, Chatswood, NSW 2067.																						**Tel: (02) 419 5879**
PC Mos/386	1000	✓D			✓			✓				XPC XON/XOFF	—	—	115K	16	16	50m	—	$295	$1100	—
Lanlink	3000				✓		✓	✓		✓		PCs, W60 terminals	Propriet	PCs	0.5M	32	32	40m+	PC-Dos comp	$199 per shuttle	—	Most PC users
Supernet Systems — 7-9 Merriwa St, Gordon, NSW 2072.																						**Tel: (02) 498 6611**
Corvus Omninet	250+	✓D			LT		CSMA/CA	✓				IBM, Mac, Rainbow, Corvus	MS/PC-Dos, 2 upwards Pascal, Pro Dos, Apple Dos, CP/M	Async, X.25, SNA, etc.	1M	64	8	1200m	Novell Adv N Constellation PC Nos	$575	Var	
Tallgrass Technologies Australia Pty Ltd — 34 East St, Five Dock, NSW 2046.																						**Tel: (02) 712 2010**
TG-8000	18	✓	✓	✓D	✓		✓	✓	✓	✓		RS232	Multiple Dos Async, Multiple Lan, TCP/IP, X.25	3270, Digital VT	Dep. on Lan	No limit	No limit	No limit	Binef	Dep. on Lan	PoA	Larger corporate network & internetworking
Techway Systems Pty Ltd — 61 Lavender St, Milsons Point, NSW 2061.																						**Tel: (02) 929 4988**
3Com Ethernet	3	✓			✓		✓	✓	✓	✓	Broadband		Via bridge	SNA 3270, X.25 XNS	10M	100/segmt 1024/ network	—	2.8km (coax)	3 Plus	PoA	PoA	—
Hyperbus	2	✓		Either			CSMA/CA	✓	✓		Fibre microwave	XNS, TCP/IP, Ethernet, IBC & comp, DEC & comp	—	Most	10M	255	indef.	no limit	Netex	PoA	PoA	Terminal traffic
Mitek	3	✓		✓D			✓	✓	✓	✓	Blockmux channel	TCP/IP, XNS, SNA, SDLC & HDLC	Ethernet SNA	Ethernet SNA	256M	No limit	No limit	No limit	Integrated	PoA	PoA	Ethernet & SNA
Wollongong Software	New product	✓		✓ND				—	—	—		TCP/IP, XNS, Dos. Decnet	—	Ethernet, DEC, PCs	Var	No limit	No limit	No limit	Wins	PoA	PoA	PC DEC, Ethernet, DEC host-to-host
Fusion Software	2	✓		✓ND								TCP/IP. XNS, Decnet, Dos	—	Ethernet, DEC, PCs	Var	No limit	No limit	No limit	Fusion network systems	PoA	PoA	Ethernet, DEC, PC, network-host
Vistalan	New product	✓	✓	Either				✓	✓	✓		IBM 327X, MAP, TOP	SNA 3270, MAP, BULL	SNA	Var	No limit	No limit	No limit	Vistalan	PoA	PoA	—
Flexlink	2	—	—	—	—	—	—	—	—	—	Channel attached to IBM Bus to DEC	IBM Channel 3270 TE File	Transfer plus Application Interface	—	24M	128 virtual circuits	—	2km	—	$1000	$2600	IBM-DEC connection
Hyper channel	30	✓D					✓				Microwave Satellite	High speed computer channels	40+ operating systems	TCP/IP	200M (4 x 50), Hyper-channel B 10M	256 adapters	—	4000km	Netex RDS	$275/ terminal	—	Disaster recovery links in IBM environment. High speed file transfer in multivendor mainframe sites
Unisys Australia Ltd Ltd — 30 Alfred St, Milsons Point, NSW 2061.																						**Tel: (02) 963 6000**
Blan (EN3) (Ethernet)	—	✓D					✓		✓			IEEE 802.3	B-net	✓	10M	99 nodes	—	500m+	Blan & Bnet	PoA	PoA	Inter-cluster networking
Blan (LN3)	2	✓D					✓				Tri-axial	IEEE 802.3	B-net	✓	10M	99 nodes	—	185m+	Blan & Bnet	PoA	PoA	Inter-cluster networking
Unisys Usernet 2	—	✓D			✓			✓				IEEE 802.5, ISO OSI	—	✓	4M	240	8	2-16km	Usernet 86 & Novell N 286	PoA	PoA	
XE5XX/B2X/B3X Cluster	9000+	✓D		✓				✓		✓		RS422-HDLC polling protocol	—	—	1.8M	Up to 64	—	400m	Btos	PoA	PoA	Inter-workstation networking
Unisys PC-Usernet	70	✓D					✓	✓				RS422/HDLC	—	✓	1M	100	8	1000m	Usernet 86 & Novell N 286	PoA	PoA	
Net 5000-7000 (Ethernet)	1	✓D					✓		✓			IEEE 802.3	UUCP	✓	10M	64 x 240	64	—	Unix TM A&T	PoA	PoA	Networking Unix processor
TDI	6500+	✓D		✓				✓				Unisys poll select	—	Async.	To 38.4K	9	—	300m+	Unisys	PoA	PoA	Local terminal network
CPlan (Ethernet)	6	✓D					✓		✓			IEEE 802.3	—	—	10M	—	100	500m+	Unisys BNA	PoA	PoA	Host-host, -workstation, workstation-workstation
Wang Computer Pty Ltd — 168 Walker St, North Sydney, NSW 2060.																						**Tel: (02) 925 5678**
Wangnet/Fastlan comprising:	52/125																			PoA	PoA	
Wang Systems Service			✓				✓		✓			Wang VS, OIS, Alliance	—	—	10M	24/63/host	—	6.5km	Netcore VSTE	—	—	Wang VS and OIS inter-system communications
Peripheral service (Wang and IBM)			✓						✓			Wang VS, IBM 3270/3274	—	—	4.27M	32 devices/channel (19 channels)		13km max.		—	—	Peripheral/terminal-host
Wang Professional Network Service (Wang PC Band)			✓		TP				✓			Wang PCs	—	—	2.5M	225/channel (4 channel)	—	13km max.	PC-PM075 inc.	—	—	Messaging, document & file transfer and resource sharing
Multi-vendor service			✓						✓			Async. IBM PC & compatibles, 3270, 802.3, networks	—	—	To 10M	Dependent on configuration			—	—	—	
Utility services	provides standard closed circuit video for user defined applications 12.7MHz video channels																	4 miles				
Zettech Software Products Pty Ltd — Suite 26, 22 Fisher Rd, Dee Why, NSW 2099.																						**Tel: (02) 981 1077**
Bos/Lan	25				TP (Arcnet)		✓		✓			—	—	—	2.5M	2500/Lan	26/Lan	6.5km	Bos/Lan			Multi-user

*Key: ✓ = column heading applies; — = column heading does not apply/information not supplied; Var = price dependent on configuration; A = Analogue; D = Digital; CSMA/CD-CA = Carrier Sense, Multiple Access with Collision Detection - Collision Avoidance; ★ = shielded/unshielded; ☆ = Dist server; ■ = mid/high split; □ = Ethernet 802.3; * = Token Bus 802.4; † = Daisy chain & star; ‡ = ex tax; § = Arcnet; # = custom installation; bsb = baseband; brb = broadband; TR = token ring; TB = token bus; TR = token passing; Adv = Advanced; N = Netware; LT = Linear topology; NR = New release; Et = Ethernet; ◀ = Vines, netware, RAF Decnet Dos, NFS & PC link; ▶ = VMS/TCP UVMS/TCP Zodiac, RAF, NSS etc.*

The Product Spotlight on Local Area Networks is based on information obtained from a survey of Lan vendors conducted between August 20 and September 22, 1987. All details should be checked with the respective companies as listed

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A position description is available and obtainable from Warren Warne, telephone (03) 69 13195.

Applications quoting Position No. 88066 should be forwarded to W. Warne, Information Systems Department, State Electricity Commission of Victoria, GPO Box 2765Y, Melbourne, 3001, by 3 February 1988.

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The quest for bandwidth

By Josh Gonz

DATA-intensive communications applications such as full-motion video, digitised graphics and even distributed databases are helping many companies to gain competitive and economic advantages. However, the bandwidth needs of these state-of-the-art applications are creating bottlenecks in communications pipelines, choking the flow of vital information and straining network capacities to their limits.

Distributed databases provide a prime example of an advanced resource requiring greater bandwidth than many users have available today.

"Like the Yellow Pages, where you let your fingers do the walking, you want to let the application do the network walking, searching out the data you want. As a result, you get higher stress on the cable," said Mark Leary, program manager for communications technology services at International Data Corp.

Some technology exists to alleviate this bottleneck. Data compression is one approach that is already well developed for video networks and probably holds a great deal more potential for both video and graphics. Super high-capacity transmission media such as fibre-optic cable will be key to supporting transport demands.

In the near future, protocols will be developed to govern wideband Integrated Services Digital Networks carrying voice, data and video at 135M-bit/sec. And powerful network switches combining the efficiencies of packet switching and the bandwidth advantages of circuit switching are on the drawing boards.

The causes

But before any of these technical balms can ease the strain, users must know where the constrictions lie and what is causing them.

Graphics, video and co-operative processing are three main culprits behind the demand for more network bandwidth.

"Business graphics are now part of the core of a presentation in the average business meeting," said Michael Weiss, senior analyst at US consulting firm Infonetics. In addition, he said, the images themselves are becoming more sophisticated, are being used in more applications, and most important to the network manager, are being shifted among workstations more often.

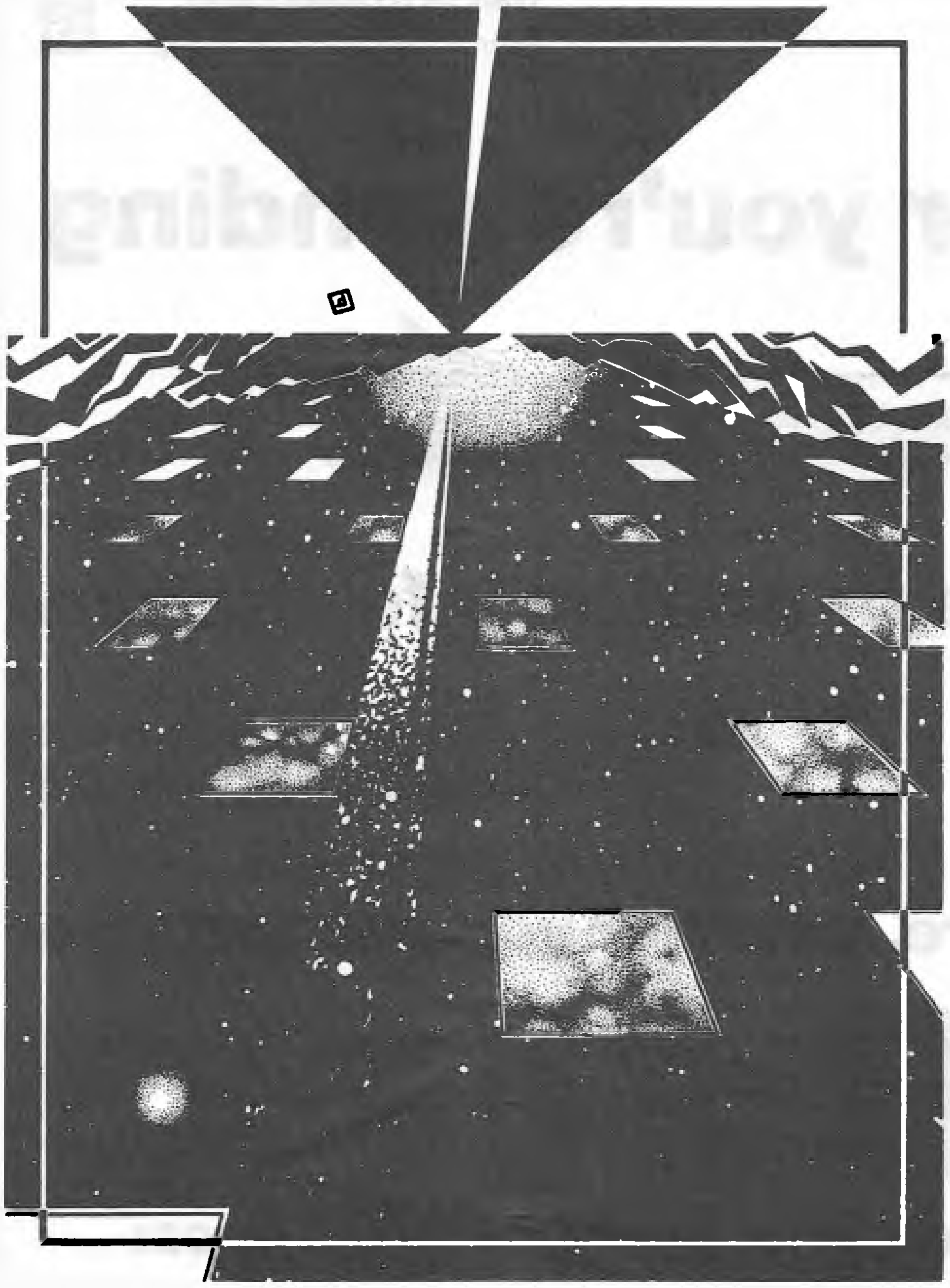
The result is pressure on the network. "In many environments today, the network becomes the limiting factor, with respect to the ability to display high-performance graphics," said Paul Bemis, senior product marketing manager for highend workstations at Apollo Computer.

The reason, as any graphics whiz can tell you, is that creating a screenful of graphics requires much more data than creating a screenful of Ascii data. High-resolution raster images are made up of millions of tiny points called pixels. To increase the resolution, the number of pixels or lines per screen, and thus the amount of data, must be increased.

Bemis gives the example of a single screen of pixels on a display showing relatively good resolution, 1024 lines by 1024 lines, with a pixel depth of eight bits: that's roughly 1M-byte of information. It takes one second to get that 1M-byte across an Ethernet that supports 10M bit/sec, if the user has access to the full bandwidth, Bemis said.

To get any kind of movement on the display, say for graphics animation, a speed of at least 10 frame/sec is necessary, which means 10M-byte/sec, or 80M-bit/sec. And extremely high-resolution graphics for print-quality images can require more than 50M-bytes per image.

Color graphics do not necessarily require more data, but conventionally, pixels indicating colors instead of the smooth grey scale have a pixel depth of 24 bits rather than 8 bits. "We're using Ethernet as a physical communications medium, but we've found it is not feasible for a user at a workstation to have the entire image shipped to his workstation, work on it and then ship the entire image somewhere else," said J. Larrea, of the New York Institute of Technology Computer Graphics Laboratory.



"It's just too much information. It takes too long, and it requires the workstation to have a lot of disk storage to store the working set of images," he added.

Two-dimensional business graphics in which low resolution is acceptable, such as bar charts used at sales meetings, use a less data-intensive imaging technology known as vector- or object-oriented graphics.

With this method, lines and colors are mathematically described for transmission across a network and converted to pixel-based raster graphics only on their final display. A simple bar chart might absorb 500 to 2.5K-bytes of data.

Engineering graphics used in computer-aided design and manufacturing are perhaps the most widely used of the resource-intensive graphics.

"The Cad/Cam environment is where you're really seeing the first generation of bandwidth-hungry applications," Mark Leary of IDC said. Engineering graphics on Cad workstations typically absorb five to 50 K-bytes of information.

Digitised, uncompressed, full-motion video requires approximately 90M-bit/sec for transmission. By skipping every other frame and implementing a variety of compression techniques, the bandwidth required is cut drastically.

Thus, video continues to find new applications both within and outside the well explored realm of teleconferencing.

The cost of video transmission lines depends on how important the quality of the image is to end users, according to David Belove, marketing manager at Compression Labs, a video equipment vendor. Users can choose their equipment for lower cost (and lower resolution) or higher cost (and higher resolution). "If it's desktop video, you could get away with 56K or 112K-bit/sec. If there will be two or three people, you'd probably want to go at 112K to 384K," Belove said.

Low-bandwidth coder/decoders marketed by Compression Labs form images with 240 lines on a screen, while the company's high-bandwidth coder/decoders provide 480 lines. Standard television uses 512 horizontal lines across the screen to form its image. High-definition television, offering high-quality screen resolution, uses a standard of 1125 horizontal lines.

Co-operative processing, a technique pioneered for use at large financial services companies, is gaining popularity in a range of environments. In co-operative processing, large tasks are distributed among networked computers.

Leary says the time for co-operative processing is now. "Anybody who's not looking at it or doing some internal development work — or not using it — is well behind the times. I would guess that there is not one brokerage on Wall Street which has not looked at some application that utilises LU6.2 or some other sort of co-operative processing."

The challenge presented to the network manager is increased bulk file transfer. More powerful workstations have enough to say in a short time — enough, Leary said, "to stretch the limits of, say, a 10M-bit/sec Ethernet."

Several approaches

Vendors offer several approaches to handling the problem of limited bandwidth on local nets. Data can be compressed to run over existing media, or the network media can be replaced with a high-capacity fibre-optic system. In addition, users can minimise the amount of network traffic by storing data on file servers.

Computer Graphics Laboratories, which manufactures computer graphics workstations, uses the last of these approaches to provide users with an efficient way to access super high-resolution raster graphics of up to 8K pixels wide and 5K pixels high.

"We keep the full image on a centralised file server and pass small portions of the image back and forth between it and the workstation so that it's not apparent to the user at the workstation," Larrea explained. "To do that, we send across approximately 1M-byte of data. If the user wants to work on a different portion of the image, we swap them." Typically, Larrea might transmit one-fortieth of an image, which takes about 45 seconds. The full image might take about 20 minutes.

But for both graphics and video, data compression remains an essential technique for packing more information into smaller spaces. "In order to get any kind of serious bandwidth out of a network, you have to do some kind of compression," said Bemis.

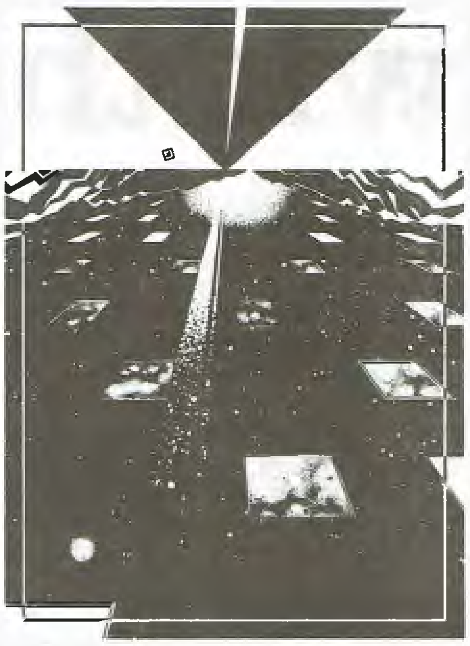
Compression technique

Compression of both raster and vector graphics data involves putting them through a compression algorithm running on specialised hardware and software. At the receiving node, an inverse algorithm decompresses the data. Unless the circuit's protocols are set up so that the compression process takes place simultaneously with transmission, a time delay is introduced.

For digitising and compressing video signals, video equipment manufacturers such as Compression Labs have a variety of specialised coder/decoders on the market. "The benefit of compression is that it dramatically reduces the cost and bandwidth required to send video signals," said David Belove.

Most video coder/decoders use a mixture of three compression techniques, Belove said. Interframe coding looks at successive frames to compare how the image has changed and then transmit only data that has changed from the previous

(Continued page 32)



‘Burning’ bandwidth

(Continued from page 31)

frame. Intraframe coding examines the content of a single frame, decides what areas are alike within it and sends summary instructions for those areas of the frame. Finally, motion compensation uses an enhanced interframe coding technique to describe how objects have moved between successive frames.

Compression and file servers are important, but they cannot compete with the high bandwidth offered by fibre. The Fibre Distributed Data Interface (FDDI), an Ansi-developed standard for fibre-optic local-area networks, permits speeds of 100M-bit/sec and a maximum cable length of about 100 km. This far surpasses the 10M-bit/sec offered by Ethernet, the 4M-bit/sec offered by IBM’s Token-Ring Network and the 12M-bit/sec offered by Apollo’s proprietary token-passing ring.

Expectations for FDDI are high. “It should resolve the problems we see today associated with bandwidth constraint,” said Bemis. Leary agreed. “Compression is a great technique, and certainly it’s been used all over,” he said, “but why invest in higher level services when they’ll inherently limit the performance of higher level applications?

“No matter how fancy you make your compression algorithm, it’s going to impose a much smaller theoretical limit on throughput than a medium like fibre”.

The transmission rates for optical fibre achieved in research laboratories have far and away out-stripped the ability to process data, according to officials at Bell Communications Research (Bellcore). These technologies are expected to be implemented in the networks of both local and long-distance carriers, beginning in the early 1990s.

To support these wideband networks, a new generation of high-speed switches will be developed, according to BBN Communications Corp’s senior consultant Mary Johnston.

Leveraging the bandwidth advantages of the former and the inherent efficiency of the latter, the switches will be equipped to handle the 135M-bit/sec ISDN standard known as H4. The CCITT is expected to recommend H4 in 1990.

Bellcore engineers are working on a plan to provide users with 150M-bit/sec fibre access to networks under a standard known as Synchronous Optical Network (Sonet). While the CCITT Study Group XVIII and Ansi T1X1.5 committees are working to finish a Sonet interface specification, at least one vendor, Licom, is already “beginning advanced development on Sonet-compatible equipment,” according to a company spokesman.

Sonet will be a synchronous protocol that breaks data into blocks called cells. These cells will be used instead of packets because they will be much smaller than conventional packets used in local nets. Packets typically contain as much as 8K-bytes of data, while cells may be limited to as little as 100-bytes, according to Stephen Walters, division manager of advanced network technology at Bellcore. The small cell size is the key to gaining the advantages of synchronous packet technology.

“Breaking the 150M-bit channel into cells gives great flexibility, and it still has the advantages of synchronism. That is, because the cells are of a fixed length and always occur, you are able to employ circuit techniques that are able to keep up at these high speeds,” Walters said.

Ensuring adaptability

The Sonet-governed cell networks will simulate a circuit-based connection for existing Mega link-type equipment, Walters said. Interfaces will be developed to ensure that installed private branch exchanges and other customer premises gear will be adaptable to the new access arrangements, he said.

Bellcore foresees the 150M-bit/sec access leading to new shared exchange locations called remote electronics modules. The modules themselves will be linked with fibre at even higher, as yet unspecified speeds.

Walters outlined four classes of new services which Bellcore expects will arise from the new networks:

- Connections between local-area networks.
- Video.
- Cable television distribution for cable service providers.
- Packetised voice services.

Walters forecast trials in the territories of all seven regional Bell holding companies in the early 1990s.

Medium-scale deployments are expected in the middle to late 1990s, and large-scale switching is not expected until the year 2000.

Until then, users will probably continue to battle bandwidth bottlenecks. In the absence of available technological solutions, they may find new ways of their own to speed data transmission.

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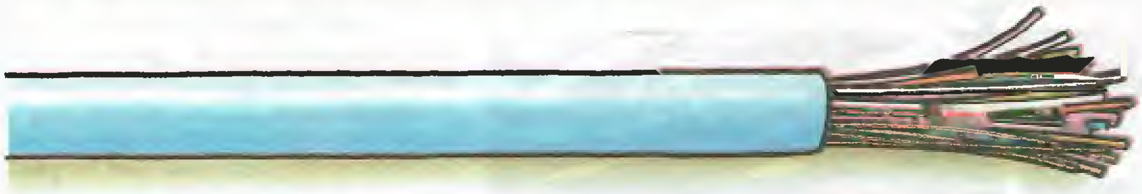
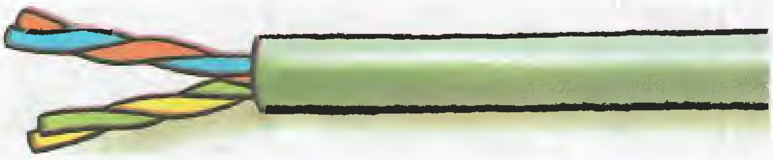
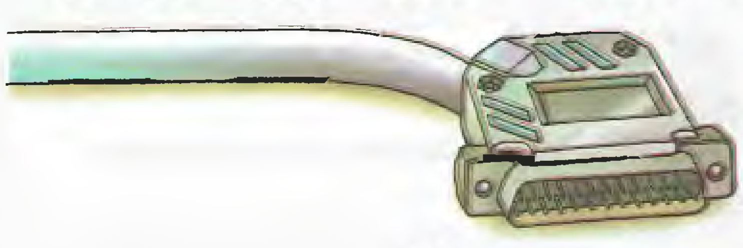


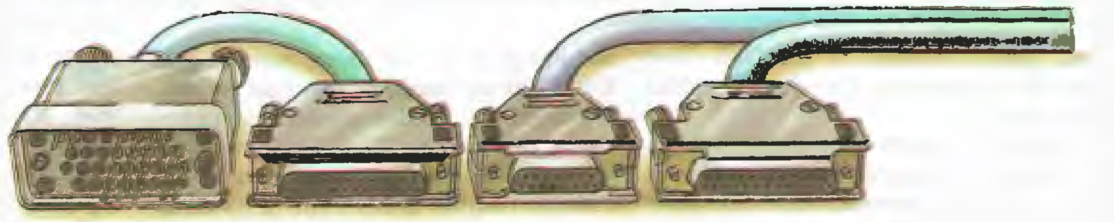
digital data or analog information



down the wire, whether you use just one



type of interface or lots of different ones:



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